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NUMERICAL INDEX OF REPORTS

Numerical Index of Official Atomic Energy Reports with Indications of Their Availability

This quarterly cummulation supplements the Numerical Index of Reports with Indications of Their Availability which appears in NSA, Volume 6, No. 24A. No further reference to the lists appearing in Vol. 7 Nos. 1 thru 6A is necessary. As reports are in manuscript form when abstracted for NSA, there may be some delay before the reports will be available at the Depository Libraries. The notation NSA in the Availability column indicates the appearance of a report in its entirety in NSA. In general, this list refers only to those reports abstracted in issues preceding the current one. Orders for items for which prices are indicated should be directed to:

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NSA - NUCLEAR SCIENCE ABSTRACTS
ADD - ABSTRACTS OF DECLASSIFIED DOCUMENTS the predecessor of NSA
NNES - National Nuclear Energy Series, published by the McGraw-Hill Book Company

Code designations are assigned as follows:

MDDC - To declassified reports released by the Manhattan Engineer District and by the Atomic Energy Commission before March 1, 1948
AECD - To declassified reports released by the Atomic Energy Commission after February 29, 1948 (appeared in April 15, Nuclear Science Abstracts)
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Other code designations below are assigned to unclassified reports by the originating installations

Report	Abstract	Availability
AECD	NSA	
2994	5-647	J. Optical Soc. Am. 42, 408-15(1952)
3243	5-6146	Phys. Rev. 88, 465-6(1952)
3246	5-6307	Rev. Sci. Instruments 23, 595-8(1952)
3290	6-893	Part in J. Applied Phys. 23, 1263-6(1952)
3328	6-2644	Anal. Chem. 24, 1780(1952)
3333	6-2604	Anal. Chem. 25, 116-19(1953)
3345	6-2934	J. Metals (N.Y.) 5, 344-8(1953)
3353	6-3216	J. Am. Chem. Soc. 74, 6040-7(1952)
3360	6-3241	J. Chem. Phys. 21, 70-2(1953)
3362	6-3258	J. Chem. Phys. 21, 42-5(1953)
3373	6-3814	$0.35
3378	6-3811	J. Am. Chem. Soc. 74, 6081-4(1952)
3414	6-4981	Phys. Rev. 89, 502-7(1953)
3420	6-5228	Phys. Rev. 88, 828-31(1952)
3428	6-5470	Phys. Rev. 88, 823-4(1952)
3430	6-5364	Nucleonics 11, No. 1, 16-21(1953)
3432	6-5710	J. Am. Chem. Soc. 74, 6065-6(1952)
3436	6-5863	Phys. Rev. 89, 320(1953)
3442	6-5813	J. Soc. Motion Picture Television Engrs. 59, 369-78(1952)
3446	6-5934	$0.90
3458	7-324	Phys. Rev. 88, 1429-31(1952)
3462	7-298	NSA; Phys. Rev. 89, 318(1953)
AECU		
1207	5-2985	Biol. Progress 2, 1-52(1952)
1360	5-5303	Rev. Sci. Instruments 23, 350-6(1952)
1471	5-5091	Anal. Chem. 24, 1076(1952)
1573	5-5182	J. Am. Chem. Soc. 74, 2701(1952)
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1664	5-6698	Botan. Gaz. 114, 141-2(1952)
1677	6-77	J. Am. Chem. Soc. 74, 3529(1952)
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1836	6-1445	Rev. Sci. Instruments 23, 309-10(1952)
1839	6-1730	Welding J. Research Supplement, 1-4 (1952)
1844	6-1427	J. Chem. Phys. 20, 746-7(1952)
1847	6-1659	J. Am. Chem. Soc. 74, 6161-7(1952)
1849	6-1428	J. Chem. Phys. 20, 1165-9(1952)
1866	6-1608	Cancer Research 12, 787-92(1952)
1868	6-1677	Discussions Faraday Soc., No. 12, 169-88 (1952)
1878	6-2125	Rev. Sci. Instruments 23, 604-6(1952)
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1906	6-2324	Phys. Rev. 87, 439(1952)
1907	6-2432	Rev. Sci. Instruments 23, 503-4(1952)
1929	6-2581	Arch. Biochem. and Biophys. 41, 42-7 (1952)
1931	6-2712	Rev. Sci. Instruments 23, 643-4(1952)
1933	6-2737	Revs. Modern Phys. 24, 120-32(1952)
1970	6-3531	Discussions Faraday Soc., No. 12, 88-98 (1952)
1983	6-3533	Discussions Faraday Soc., No. 12, 33-44 (1952)
1984	6-3214	J. Am. Chem. Soc. 74, 6007-12(1952)
1995	6-3332	Rev. Sci. Instruments 23, 571-2(1952)
1997	6-3348	J. Am. Soc. Naval Engrs. 64, 611-19(1952)
1998	6-3215	J. Am. Chem. Soc. 74, 4174(1952)
2016	6-3525	Acta Cryst. 5, 683(1952)
2018	6-3738	Arch. Biochem. and Biophys. 41, 212-32 (1952)
2019	6-3671	Phys. Rev. 87, 785-6(1952)
2042	6-3958	J. Applied Phys. 23, 1257-61(1952)
2043	6-4197	Phys. Rev. 87, 915-21(1952)
2053	6-4252	Phys. Rev. 87, 528-9(1952)
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2075	6-4524	J. Am. Chem. Soc. 74, 5530(1952)
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2078	6-4448	J. Am. Chem. Soc. 74, 5531(1952)
2087	6-4342	Arch. Biochem. and Biophys. 41, 367-77 (1952)
2104	6-4941	Phys. Rev. 88, 418(1952)
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2116	6-4850	Science 116, 354-5(1952)
2119	6-4942	Phys. Rev. 88, 892(1952)
2133	6-5088	J. Applied Mechanics 19, 572-4(1952)
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2154	6-5342	J. Am. Chem. Soc. 74, 6213-16(1952)
2160	6-5291	J. Biol. Chem. 199, 245-50(1952)
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AECU	NSA	
2202	6-5714	Science 116, 603(1952)
2206	6-5925	Cancer Research 12, 909-11(1952)
2216	6-6013	Arch. Biochem. and Biophys. 41, 1-8(1952)
2217	6-6477	Nucleonics 10, No. 12, 54-7(1952)
2229	6-6343	Proc. Soc. Exptl. Biol. Med. 81, 416-17 (1952)
2234	6-6565	J. Am. Chem. Soc. 74, 5548(1952)
2235	6-6474	Phys. Rev. 88, 417-18(1952)
2237	6-6439	Phys. Rev. 88, 414-15(1952)
2239	6-6371	Phys. Rev. 88, 1172-6(1952)
2240	6-6372	Phys. Rev. 88, 1182-6(1952)
2256	6-6570	J. Am. Chem. Soc. 74, 6154-5(1952)
2265	6-6495	Nucleonics 11, No. 1, 9-11(1953)
2277	7-344	$0.20
2289	7-591	J. Chem. Phys. 20, 1974-5(1952)
2328	7-734	NSA
AERE-C/R		
801	6-2860	J. Chem. Soc., 4315-30(1952)
AERE-T/R		
963	7-300	Proc. Roy. Soc. (London) 215, 398-403 (1952)
983	7-345	Proc. Roy. Soc. (London) 215, 497-507 (1952)
ANL		
4645	5-5089	J. Chem. Phys. 20, 1438-42(1952)
4723	6-1415	J. Chem. Phys. 20, 1443-7(1952)
4782	6-4035	J. Am. Chem. Soc. 74, 4679(1952)
4783	6-4034	J. Am. Chem. Soc. 74, 4682(1952)
4813	6-4572	J. Am. Chem. Soc. 74, 6091-6(1952)
4865	6-6710	Phys. Rev. 89, 302-9(1953)
BMI		
788	7-1120	$0.20
BNL		
186	6-5750	Nucleonics 10, No. 12, 72-3(1952)
1051	6-1928	Ann. N. Y. Acad. Sci. 55, 904-14(1952)
1080	6-1678	Discussions Faraday Soc., No. 12, 79-87 (1952)
1097	6-2294	J. Phys. Chem. 56, 846-52(1952)
1157	6-5185	Revs. Modern Phys. 24, 179-239(1952)
1177	6-4637	Rev. Sci. Instruments 23, 629-34(1952)
1190	6-5010	Am. J. Physiol. 171, 17-21(1952)
1199	6-5247	Acta Cryst. 5, 768-70(1952)
1201	6-5292	Proc. Soc. Exptl. Biol. Med. 80, 741(1952)
1210	6-5503	Phys. Rev. 88, 851-9(1952)
1211	6-5378	J. Applied Phys. 23, 1379-82(1952)
1213	6-5356	J. Am. Chem. Soc. 74, 6144(1952)
1218	6-6176	Phys. Rev. 88, 1190-6(1952)
1219	6-6177	Phys. Rev. 88, 1197-9(1952)
1230	6-5937	Nucleonics 10, No. 11, 88-9(1952)
1231	6-6149	Phys. Rev. 88, 1257-61(1952)
1232	6-5938	Proc. Soc. Exptl. Biol. Med. 81, 348-50 (1952)
1243	6-6411	Phys. Rev. 88, 958-9(1952)
1246	6-6189	Phys. Rev. 88, 1186-90(1952)
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1253	6-6465	Phys. Rev. 88, 1312-21(1952)
1261	7-680	Phys. Rev. 89, 204-22(1953)
1263	6-6693	Phys. Rev. 88, 954-5(1952)
1271	7-668	Nucleonics 11, No. 1, 66(1953)
1274	7-671	J. Chem. Phys. 21, 182(1953)
1294	7-998	Phys. Rev. 89, 323-4(1953)
CU		
99	7-672	NSA
103	6-5703	Phys. Rev. 87, 391-2(1952)
ISC		
174	7-242	$0.55
212	6-3073	J. Phys. Chem. 56, 1097-1101(1952)
ISC	NSA	
237	6-5367	$0.55
249	6-5380	Phys. Rev. 88, 1092-8(1952)
K		
768	5-5148	J. Am. Chem. Soc. 74, 5749-51(1952)
788	5-7040	J. Phys. Chem. 56, 1010(1952)
941	6-5807	Acta Cryst. 6, 55-6(1953)
LAMS		
1396	6-5469	Nucleonics 11, No. 1, 67-9(1953)
ML		
165	6-6132	Phys. Rev. 88, 1053-64(1952)
MLM		
639	6-1432	Anal. Chem. 24, 1678(1952)
MTA		
2	7-889	NSA
NAA-SR		
159	6-1152	J. Applied Phys. 23, 1194-1200(1952)
167	6-4430	J. Applied Phys. 23, 1200-6(1952)
185	6-4681	Nucleonics 11, No. 1, 42-3(1953)
NM		
001-059.13.03	7-603	J. Aviation Med. 25, 334-44, 401(1952)
NP		
3601	6-1451	Nucleonics 10, No. 12, 58-61(1952)
3643	6-2342	J. Am. Chem. Soc. 74, 3489-92(1952)
3720	6-3220	Phys. Chem. 56, 858(1952)
3951	6-5351	J. Am. Chem. Soc. 74, 6074-6(1952)
3769	6-3419	Phys. Rev. 89, 490-501(1953)
4113	7-269	Phys. Rev. 88, 998-1002(1952)
4123	7-301	Phys. Rev. 86, 73-81(1952)
NRL		
4013	6-5641	Nucleonics 11, No. 1, 22-7(1953)
NYO		
530	6-3042	Phys. Rev. 82, 796-807(1951)
736	5-6654	J. Am. Chem. Soc. 74, 1383-5(1952)
766	6-3857	Rev. Sci. Instruments 23, 519-22(1952)
846	6-807	J. Am. Chem. Soc. 74, 6109-12(1952)
847	6-3232	J. Am. Chem. Soc. 74, 6112-13(1952)
851	6-1640	J. Am. Chem. Soc. 74, 6112-13(1952)
3091	7-1150	$0.25
3107	7-586	0.35
3187	6-5316	Anal. Chem. 25, 192-4(1953)
3217	6-5895	Phys. Rev. 88, 1099-1109(1952)
3218	6-5686	Phys. Rev. 88, 1206-7(1952)
3226	7-303	Phys. Rev. 89, 349-52(1953)
3228	6-6720	$0.70
3374	6-4744	J. Am. Chem. Soc. 74, 6103-4(1952)
3377	6-6580	J. Am. Chem. Soc. 74, 5217(1952)
3407	6-6203	J. Optical Soc. Am. 42, 706-12(1952)
3505	6-6557	$0.25
3610	6-4412	Anal. Chem. 24, 1931-3(1952)
3662	7-660	Phys. Rev. 88, 954(1952)
3663	7-692	NSA
3700	7-304	Phys. Rev. 89, 396-8(1953)
3702	6-6427	Phys. Rev. 88, 956-7(1952)
3703	7-270	Phys. Rev. 88, 1211-12(1952)
3705	7-349	Phys. Rev. 88, 1208-9(1952)
3837	7-228	Phys. Rev. 88, 683-4(1952)
3901(p.3-12)	7-388	Phys. Rev. 89, 182-5(1953)
3901(p.13-24)	7-389	Phys. Rev. 88, 1065-9(1952)
4025	6-6293	Pediatrics 10, 667-75(1952)

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ORNL	NSA	
842	6-1163	Anal. Chem. 24, 1895-9(1952)
1303	7-761	$0.20
1370	6-6589	0.35
1376	7-124	0.20
1406	7-1174	$0.20
SO		
2023	6-6613	J. Applied Phys. 23, 1409-10(1952)
TID		
389	6-3957	$3.10
3032	7-1539	0.25
5086(1st rev.)	6-5960	0.45
UCLA		
165	6-36	J. Cellular Comp. Physiol. 40, 115-25 (1952)
190	6-2805	J. Am. Pharm. Assoc., Sci. Ed. 41, 510-11 (1952)
194	6-3344	Nucleonics 10, No. 12, 65-7(1952)
204	6-4343	J. Am. Pharm. Assoc., Sci. Ed. 41, 559-61 (1952)
219	6-5834	Nucleonics 10, No. 12, 74(1952)
UCRL		
1564	6-831	J. Phys. Chem. 56, 901(1952)
1565	6-832	J. Phys. Chem. 56, 897(1952)
1568	6-850	J. Am. Chem. Soc. 74, 5975-9(1952)
1593	6-1004	Phys. Rev. 89, 508-17(1953)
1657	6-2328	Discussions Faraday Soc. No. 12, 155-61 (1952)
1673	6-2506	Phys. Rev. 89, 78-9(1953)
1792	6-4947	Phys. Rev. 88, 901-8(1952)
1846	6-4760	J. Am. Chem. Soc. 74, 6272-3(1952)
1864	7-66	$0.25
1881	6-5457	Phys. Rev. 88, 750-1(1952)
1914	6-6453	Phys. Rev. 89, 1-3(1953)
1929	7-620	$0.25
1931	7-108	0.10
1932	7-676	0.20
1940	7-272	Phys. Rev. 88, 1426-7(1952)
1941	6-6641	Acta Cryst. 6, 106(1953)
1947	7-173	$0.25
1951	7-340	0.35
1957	7-524	0.20
1963	7-273	Phys. Rev. 88, 1427(1952)
1967	7-977	$0.35
1999	7-845	0.20
UR		
211	6-5011	Science 116, 706-8(1952)
223	7-763	J. Biol. Chem. 199, 199-205(1952)
USNRDL		
341	6-3500	Am. J. Physiol. 170, 724-30(1952)
343	6-5403	Am. Ind. Hyg. Assoc. Quart. 13, 226-31 (1952)
350	6-4372	Am. J. Physiol. 171, 349-53(1952)
352	6-5278	Nucleonics 11, No. 1, 56-61(1953)
358	6-5951	Nucleonics 11, No. 1, 56-61(1953)

NEW NUCLEAR DATA

Summary of New Nuclear Data on Half Lives, Radiations, Relative Isotopic Abundances, Nuclear Moments, Neutron Cross Sections, Reaction Energies, and Masses.

Prepared by National Bureau of Standards Nuclear Data Group with assistance of Readers.

National Bureau of Standards Group: K. Way, C. L. McGinnis, M. Wood, and K. Thew.

Leaders of groups in other laboratories which are assisting with the abstracting: G. Scharff-Goldhaber, Brookhaven National Laboratory; J. M. Hollander, University of California; C. S. Wu, Columbia University; P. Axel, University of Illinois; A. C. G. Mitchell; L. M. Langer, University of Indiana; J. R. Stehn, Knolls Atomic Power Laboratory; H. Pomerance, Oak Ridge National Laboratory; E. O. Wiig, R. W. Fink, University of Rochester; W. E. Meyerhof, Stanford University; L. Slack, Naval Research Laboratory.

The material cumulated here is that which has appeared in NSA Vol. 7, Nos. 1 through 6A.

ABBREVIATIONS

a	absorption measurement
$a\beta\gamma$	absorption of β's in coincidence with γ's
ace^-	absorption of conversion electrons
a coin	measurement by placing absorbers between counters in coincidence
α	total γ-ray conversion coefficient, N_e/N_γ
$\alpha_K, \alpha_L, \ldots$	γ-ray conversion coefficient for electrons ejected from the K,L,... shell
b	coefficient in angular correlation function, $1 + b \cos^2 \theta$
B	band spectra method
$Be\gamma n$	measurement by detection of photoneutrons from Be
$\beta\gamma, \gamma\gamma$	$\beta\gamma$ or $\gamma\gamma$ coincidences
$\beta\gamma(\theta)$	angular correlation of β's and γ's in coincidence
Calc	calculated value from experimental work reported elsewhere
cc	cloud chamber
ce^-	conversion electrons
chem	chemical separation of product following reaction
Cpt	Compton electrons
d	(1) deuteron, (2) descendant of, (3) days, when used as superscript
$d,p(\theta)$	angular distribution of protons with respect to deuteron beam
$D\gamma n, D\gamma p$	measurement by detection of photoneutrons or photoprotons from deuterium
$\bar{E}$	average energy
E_θ	resonance energy
$E_\beta, E_\gamma, \ldots$	energy of β ray, energy of γ ray,...
E_{dis}	disintegration energy
EA	electrostatic analyzer
E1,E2,...	electric dipole, electric quadrupole
ϵ	electron capture
ϵ_K, ϵ_L	electron capture from K, L shell
f	fission, in abbreviations for methods of production or detection
F-K	Fermi-Kurie β energy distribution plot
$\gamma(\theta,T)$	numbers of γ's as function of angle and temperature
Γ	resonance half-width (the whole width at half-maximum)
g.s.	ground state
I	(1) spin in units of $h/2\pi$; (2) nuclear induction magnetic resonance method
ic	ionization chamber
J	quantum state of compound nucleus in a nuclear reaction. "I" is used to denote the spin of the target nucleus, final nucleus
K/L	α_K/α_L
l	angular momentum of particle absorbed into nucleus
M	molecular or atomic beam resonance method
M1,M2,...	magnetic dipole, magnetic quadrupole...
mb	millibarns
Mic	microwave method
mir	measurement by total reflection of neutron beam from mirror surface
ms	mass spectrometer
μ	(1) magnetic moment in units of nuclear magnetons, (2) micron, 10^{-4} cm
μs	microseconds

osc	pile oscillator method	σ_θ	cross section at resonance energy, E_θ
p	(1) proton, (2) predecessor of	σ_a	absorption cross section
para	paramagnetic resonance method	σ_{el}	elastic scattering cross section
pc	proportional counter	σ_{in}	inelastic scattering cross section
pe^-	photo electrons	σ_s	scattering cross section
ppl	photoplates or emulsions	σ_t	total cross section
q	electric quadrupole moment in units of barns	t	triton, H^3
		τ	half life in units indicated
Q	reaction energy in Mev	τ_1, τ_2	half life of upper, lower state
s	(1) spectrometer method, (2) seconds, when used as superscript	th	thermal
		w,vw	weak, very weak
S	atomic-spectra measurement	(0.123)	β and γ energy values enclosed in parentheses are given for identification purposes
scin	scintillation counter		
sl	lens spectrometer		
sl;ce^-	conversion electrons measured in lens spectrometer	%	% of disintegrations
		†	relative numbers. When used in connection with γ rays, relative numbers of photons, not photons plus conversion electrons, are meant
st	strong		
$s\pi$	180° spectrometer		
$s\pi\sqrt{2}$	double focusing spectrometer		
σ	cross section in barns	+,−	even, odd parity

Standard journal abbreviations are used.
All energies are given in Mev and all cross sections in barns unless otherwise stated in the tabular material.

MAGNETIC MOMENT STANDARDS

In order to have a consistent basis for recording data on magnetic moments, results have been based on the following values and are without diamagnetic corrections.

$\mu(H^1) = 2.7934$ nuclear magnetons
This value has been adopted arbitrarily because it is the one used as a base in the Table of H. L. Poss, The Properties of Atomic Nuclei, I. Spins, Magnetic Moments and Electric Quadrupole Moments. (Revised, BNL-26 (T-10), (unclassified).) The values reported in the New Nuclear Data summaries are thus directly comparable with those listed in the survey of Poss.

$\nu(Na^{23})/\nu(H^1) = 0.26450$ E. Bleuler, M. Gabriel, Helv. Phys. Acta 20, 67(1947).

$\nu(D)/\nu(H^1) = 0.153506$ F. Bloch, E. C. Levinthal, M. E. Pachard, Phys. Rev. 72, 1125(1947).

$\nu(B^{11})/\nu(H^1) = 0.320827$ D. A. Anderson, Phys. Rev. 76, 434(1949).

H^3_1

β^- 0.0180 log ft = 3.006 s

Neutrino mass <0.250 kev

F-K plot straight down to 5.5 kev

L.M.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 689(1952).

He^3_2

I 1/2 M

G.Weinrich, V.W.Hughes, BAPS 28, 1, UA2(1953).

He^5_2

Levels $He^4(n,n)$ $E_n = 4.14$ ic

$n,\alpha(\theta)$ g.s. $p_{3/2}$

1.76 $p_{1/2}$

P.Huber, E.Baldinger, Helv. Phys. Acta 25, 435 (1952).

Level $H^3(d,n)He^4$ E_n=0.01 to 1.73 pc

16.65 $J = 3/2^+$

$\sigma_{max} = 5.1 \pm 0.1$ for $E_d = 0.109$

J.P.Conner, T.W.Bonner, J.R.Smith, Phys. Rev. 88, 468(1952).

Level $H^3(d,n)He^4$ E_d = 0.015 to 0.125

16.64

σ_{max} = 4.95 for E_d = 0.107

E.J. Stovall, Jr., W.R.Arnold, J.A.Phillips, G.A. Sawyer, J.L.Tuck, Phys. Rev. 88, 159A(1952).

Level $H^2(t,n)He^4$ E_t = 0.08 to 1.2

t,n(θ) 16.65 $J = 3/2^+$ long counter

$\sigma_{max} = 4.9 \pm 0.5$ for E_t = 0.165

H.V.Argo, R.F.Taschek, H.W.Agnew, A.Hemmendinger, W.T.Leland, Phys. Rev. 87, 612(1952).

He^6_2

τ 0.83 s pc

$Li^6(n,p)$ $Li^7(n,d)$ $Be(n,\alpha)$

M.E.Battat, F.L.Ribe, Phys. Rev. 88, 159A (1952); 88, 156(1952).

τ 0.84 s $Be^9(n,\alpha)$

G.Vendryes, Ann. Phys. 7, 655(1952).

Li^5_3

Level $He^3(d,p)He^4$ E_d=0.19 to 1.60 pc

16.78 $J = 3/2^+$

σ_{max} = 0.69 for E_d = 0.400

T.W.Bonner, J.P.Conner, A.B.Lillie, Phys. Rev 88, 473(1952).

Li^6_3

No 3.58 level by $Li^6(d,d)$ E_d = 7.70 s rr

3.58 level was observed by $Li^6(p,p)$

C.P.Browne, C.K.Bockelman, W.W.Buechner, A.Sperduto, BAPS 28, 1, C9(1953).

Li^7_3

Level $Li^6(d,p)$ E_d = 1.5

γ 0.477 sl pe

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

Be^7_4

Level $Li^6(d,n)$ E_d = 1.5

γ 0.429 sl pe

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

Level $B^{10}(p,\alpha)$ E_p = 3.333, 1.460 Ra

0.429 ± 0.003

D.S.Craig, D.J.Donahue, K.W.Jones, Phys. Rev. 88, 808(1952).

Levels $Li^7(p,n)$ E_p = 18.3 ppl

4.6

7.1

D.W.Thomson, Phys. Rev. 88, 954(1952).

Be^8_4

Levels $B^{11}(\gamma,t)$ E_γ = 17.6 ppl

2.9 Γ = 1.8

3.4 ± 0.2 Γ = 0.8

4.05 ?

O.Rochat, P.Stoll, Helv. Phys. Acta 25, 451(1952).

$p,\alpha(\theta)$ $Li^7(p,\alpha)He^4$ E_p = 0.08 to 0.90

l_p = 1 and 3

F.Hirst, Australian J. Sci. Res. 4A, 284(1951); 5A, 570(1952).

Be^9_4

Levels Be(p,p) E_p = 31.5 scin

2.5 11.6

6.8

R.Britten, Phys. Rev. 88, 283(1952).

$B^{11}(d,\alpha n)Be^8$ E_d = 0.425 scin

n's observed, assigned to 2.4 level of Be^9

G.A.Dissanaike, J.O.Newton, Proc. Phys. Soc. 65A, 675(1952).

Be^{10}_4

Levels $Be^9(d,p)$ E_d = 14.3

d,p(θ) g.s. l_n = 1

(3.37) l_n = 1

C.F.Black, BAPS 28, 1, W10(1953).

Levels $Be^9(d,p)$ E_d = 3.6 ic

d,p(θ) g.s. l_n = 1

(3.37) l_n = 1

H.W.Fulbright, J.A.Brunner, D.A.Bromley, L.W. Goldman, Phys. Rev. 88, 700(1952).

$_{4}Be^{10}_{6}$

Level Be(d,p) $E_d = 1.2$
γ (3.38) E1 or E2 e^+ spectrum

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

Levels Be(d,p) $E_d = 3.49$ ppl
No states between g.s. and 3.37 level

F.Ajzenberg, Phys. Rev. 88, 298(1952).

d,p(θ) graph Be(d,p) $E_d = 0.40$ ppl

D.de Jong, P.M.Endt, Physica 18, 407(1952).

$_{5}B^{10}_{5}$

|q| 0.105 Solid $B(CH_3)_3$ Mic

H.G.Dehmelt, Z. Phys. 133, 528(1952).

No 1.74 level by $B^{10}(d,d)$ $E_d = 6.9$ sπ
1.74 level was observed by $B^{10}(p,p)$

C.K.Bockelman, C.P.Browne, A.Sperduto, W.W. Buechner, BAPS 28, 1, C8(1953).

Levels Be(d,n) $E_d = 3.39$ ppl
d,n(θ)

0	+	
0.72	+	5.58
1.75	+	5.93
2.15	+	6.12
3.53	+	6.38 −
4.78		6.58
double 5.14	−	6.77

Possible levels at 5.37, 5.72

F.Ajzenberg, Phys. Rev. 88, 298(1952); 87, 205A(1952); 82, 43 (1951).

Level $B^{10}(p,p)$ $E_p = 2.191$ EA
0.719 ±0.0016
Level value indicates $\tau(0.718\gamma) > 10^{-13}$ s
No other levels for $E_p \leq 4.2$

D.S.Craig, D.J.Donahue, K.W.Jones, Phys. Rev. 88, 808(1952).

$_{5}B^{11}_{6}$

|q| 0.051 Solid $B(CH_3)_3$ Mic

H.G.Dehmelt, Z. Phys. 133, 528(1952).

Levels $Li^7(\alpha,\gamma)$

Level	I*	Level	I*
2.14	1/2 ±	8.93	3/2 +
4.46	5/2 +	9.19	7/2 +
5.03	1/2 ±	9.28	5/2 −
6.81	3/2 +		

*From γ intensities, $\alpha\gamma(\theta)$, and $\gamma\gamma(\theta)$

G.A.Jones, D.H.Wilkinson, Phys. Rev. 88, 423 (1952).

d,p(θ) B(d,p) $E_d = 0.29$ ppl
Graphs for g.s., 2.14, 4.46, and 5.03 levels

P.M.Endt, C.H.Paris, H.W.Jongerius, F.P.G.Valckx, Physica 18, 423(1952).

$_{6}C^{12}_{6}$

Levels C(p,p) $E_p = 31.5$ scin
4.3 9.5
7.5 ? 11 – 17 unresolved group

R.Britten, Phys. Rev. 88, 283(1952).

$_{6}C^{12}_{6}$

Level $N^{15}(p,\alpha)$ $E_p = 1.6$
γ 4.44 sl Cpt
$\tau < 3 \times 10^{-13}$ s Doppler correction

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

Level $C^{12}(n,n\alpha)Be^8$ g.s. $E_n \sim 25$ cc
9.7 $\Gamma = 1.6$

J.D.Jackson, D.I.Wankiyn, BAPS 28, 1, W6(1953).

Levels $B^{11}(p,\alpha)Be^8$ $E_p = 0.13$ to 0.28
p,$\alpha(\theta)$

(16.11)	2 +	$l_p = 1$	pc
(~16.17)	1 − ?	$l_p = 0$	

D.W.Thomson, A.V.Cohen, A.P.French, G.W.Hutchinson, Proc. Phys. Soc. 65A, 745(1952).

p,$\gamma(\theta)$ $B^{11}(p,\gamma)$ $E_p = 0.50$
11.8-Mev γ originates from I = 1− level
16.3-Mev γ originates from I = 2+ level

H.Gilttil, P.Stoll, Helv. Phys. Acta 25, 455 (1952).

Resonances $C^{12}(\gamma,3\alpha)$ ppl

18.4	24.5
21.8	29.4

F.K.Goward, J.J.Wilkins, Proc. Phys. Soc. 65A, 671(1952).

$_{6}C^{13}_{7}$

Level C(d,p) $E_d = 1.5$
γ 3.082 E1 e^+ spectrum sl pe⁻
$\tau < 3 \times 10^{-13}$ s Doppler correction

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

Level $C^{13}(p,p)$ $E_p = 8$ s
3.69

J.C.Arthur, A.J.Allen, R.S.Bender, M.J.Mausman, C.J.McDole, Phys. Rev. 88, 1291(1952).

Levels $C^{12}(n,n)$ $E_n = 2.6$ to 4.15
n,n(θ)

7.67	$d_{3/2}$
7.75	$s_{1/2}$

Rise in σ_t at $E_n = 3.6$ not resonance

P.Huber, E.Baldinger, R.Budde, Helv. Phys. Acta 25, 444(1952).

Level $C^{12}(n,n)$ $E_n = 3.62$ scin
n,n(θ) (3.80) $d_{3/2}$

A.E.Remund, R.Ricamo, Helv. Phys. Acta 25, 447 (1952).

d,p(θ) graph C(d,p) $E_d = 0.37$ ppl

B.Koudijs, P.M.Endt, J.M.van der Hart, P.J.W. Palmer, Physica 18, 415(1952).

$_{6}C^{14}_{8}$

Level $C^{13}(d,p)$ $E_d = 1.6$
γ 6.11 sl pe⁻

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

d,p(θ) graph $C^{13}(d,p)$ $E_d = 0.37$ ppl

B.Koudijs, P.M.Endt, J.M. van der Hart, P.J.W. Palmer, Physica 18, 415(1952).

$_{7}N^{14}_{7}$ γ's $C^{13}(d,n\gamma)$ $E_d = 1.5$

0.725*	3.38	sl pe⁻ Cpt
1.638	5.05	
2.31	5.69	

*Assignment uncertain

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

No 2.31 level by N(d,d) $E_d = 6.98$ sπ
2.31 level was observed by N(p,p)

C.P.Browne, C.K.Bockelman, W.W.Buechner, A.Sperduto, BAPS 28, 1, C9(1953).

$_{8}O^{15}_{7}$ Levels $N^{14}(p,\alpha)20.4^{m}C^{11}$ $E_p = 6.6$

11.9	12.5	stacked foils
12.2	13.0	

J.P.Blaser, F.Marmier, W.Sempert, Helv. Phys. Acta 25, 442(1952).

$_{8}O^{16}_{8}$ Level $O^{16}(p,p)$ $E_p = 8$ s

6.0	
6.1	

Doublet separation = 0.087 ± 0.010

J.C.Arthur, A.J.Allen, R.S.Bender, H.J.Hausman, C.J.McDole, Phys. Rev. 88, 1291(1952).

Levels $F^{19}(p,\alpha\gamma)$ $E_p = 0.874, 0.935$
$\alpha\gamma(\theta)$ (6.91) $I = 2^+$ sπ scin
(7.12) $I = 1^-$

J.Seed, A.P.French, Phys. Rev. 88, 1007(1952).

Levels $F^{19}(p,\alpha\gamma)$ $D(\gamma,p)$ in ppl
γ polarization (6.91) even
(7.12) odd

L.W.Fagg, S.S.Manna, Phys. Rev. 88, 1205(1952).

Resonances $O^{16}(\gamma,4\alpha)$ $E_\gamma \leqslant 20$ to $\leqslant 70$ ppl

22.6	29.5	
25.8		

F.K.Goward, J.J.Wilkins, Proc. Phys. Soc. 65A, 671(1952).

Resonances $O^{16}(\gamma,4\alpha)$ $E_\gamma \leqslant 32$ ppl

22*	29 ?
25	

*Alternative modes of disintegration via Be^8, C^{12}

D.L.Livesey, C.L.Smith, Proc. Phys. Soc. 65A, 758(1952).

$_{8}O^{17}_{9}$ Level $O(d,p)$ $E_d = 1.5$
γ 0.871 $\alpha = 7 \times 10^{-6}$ sl pe⁻ ce⁻

R.G.Thomas, T.Lauritsen, Phys. Rev. 88, 969(1952).

Levels $F^{19}(d,\alpha)$ $E_d = 1.8, 2.0$ s

0.883	5.229	5.95
3.069	5.397	6.87
3.856	5.723	6.99 ?
4.567	5.875	7.37 ?

Relative intensities given

W.A.Watson, W.W.Buechner, Phys. Rev. 88, 1324 (1952).

$_{9}F^{18}_{9}$ Resonances $N(\alpha,p)O^{17}$ $E_\alpha = 5.30$ cc

1.02	2.48	3.54
1.58	2.74	3.80
1.96	3.04	4.06

M.C.Kavadeniz, Istanbul Üniv. Fen Fakült. Mecmuasi 17A, 1(1952).

$_{9}F^{19}_{10}$ Levels $Ne^{21}(d,\alpha)$ $E_d = 2.129$ s

0.113
0.192

C.Milelkowsky, W.Whaling, Phys. Rev. 88, 1254 (1952).

Levels $F^{19}(p,p)$ $E_p = 8$ s

1.37	3.94	4.48
1.59	4.06	4.59
2.82	4.41	4.76

J.C.Arthur, A.J.Allen, R.S.Bender, H.J.Hausman, C.J.McDole, Phys. Rev. 88, 1291(1952).

$_{9}F^{20}_{11}$ β^- 5.41 F-K plot linear
γ 1.631
No $\beta^- > 5.4$ (< 1%) No $\gamma > 1.67$ (< 0.25%)
F^{19} (1.8-Mev d,p); sl pe⁻

D.E.Alburger, Phys. Rev. 88, 1257(1952).

Level $F^{19}(d,p)$ $E_d = 14.3$
d,p(θ) g.s. $l_n = 2$

C.F.Black, BAPS 28, 1, W10(1953).

Levels $F^{19}(d,p)$ E_d = 1.5 to 2.1 s

0.652	1.309	2.870	3.586	4.275
0.828	1.970	2.966	3.681	4.310
0.938	2.048	3.491	3.961	5.062?
1.059	2.195	3.528	4.079	

Relative intensities given

W.A.Watson, W.W.Buechner, Phys. Rev. 88, 1324 (1952).

$_{10}Ne^{20}_{10}$ Resonances $F^{19}(p,\alpha\gamma)O^{16}$ sπ scin

	E_α	J
$\alpha\gamma(\theta)$	0.669	1^+
$\alpha\gamma(\theta)$, $p\gamma(\theta)$	0.874	2^-
$\alpha\gamma(\theta)$	0.935	1^+

J.Seed, A.P.French, Phys. Rev. 88, 1007(1952).

Resonances $F^{19}(p,\alpha)O^{16}$ g.s. pc
p,$\alpha(\theta)$

E_α	J	Rel. Yield	Γ
1.09*		0.13*	0.03*
1.23		0.26*	0.08*
1.38	2^+	1.0	0.10*
1.73	0^+	3.0	0.10*
1.91	1^-	6.0	0.20*

E.B.Paul, R.L.Clarke, W.T.Sharp, BAPS 28, 1, W8 (1953); *verbal report.

Ne^{21} (10 11)

Levels $Ne^{20}(d,p)$ $E_d = 7.8$ ppl

d,p(θ)

Level	I	l_n
g.s.	$d_{3/2}$ *	2
(0.33)	$d_{5/2}$ *	2
(1.68)		0 or 1
(2.79)		0

For levels at 3.73, 4.71, 5.44, 5.74, 7.30, l_n = 1 or 2

*From relative cross-sections

R.Middleton, C.T.Tai, Proc. Phys. Soc. 65A, 752 (1952).

Ne^{22} (10 12)

Levels $F^{19}(\alpha,p)$ $E_\alpha = 5.30$ ppl

0.57
1.34
2.84

E.Hjalmar, H.Slätis, Arkiv Fysik 4, 323(1952).

Na^{22} (11 11)

γ (1.28) $\alpha = 7 \times 10^{-6}$ s ce⁻

G.Hinman, D.Brower, R.Leamer, BAPS 28, 1, S7 (1953).

Na^{24} (11 13)

γ 1.3679 ± 0.0010 sm 2 pe⁻
2.7535 ± 0.0010

A.Hedgran, D.Lind, Arkiv Fysik 5, 177(1952).

γ (1.38) $\alpha_{pair} = 0.6 \times 10^{-4}$ E2 sl
(2.76) $\alpha_{pair} = 7.1 \times 10^{-4}$ E2

S.D.Bloom, Phys. Rev. 88, 312(1952); 87, 236A(1952); 87, 181(1952).

γ (1.38) $\alpha_{pair} = 3 \times 10^{-5}$ E2 sl
(2.76) $\alpha_{pair} = 8 \times 10^{-4}$ E2

H.Slätis, K.Siegbahn, Arkiv Fysik 4, 485(1952).

Levels $Na^{23}(d,p)$ ppl

0.472	3.409	3.899
0.564	3.582	3.929
1.341	3.623	4.184
1.844	3.648	4.202
1.884	3.738	4.219
2.464	3.850	4.558
2.561		

A.Sperduto, W.W.Buechner, Phys. Rev. 88, 574 (1952).

Capture γ's $Na^{23}(n,\gamma)$ 2 crystal scin s

50†	0.48	5†	1.66
18†	0.86	11†	2.0
10†	1.34	24†	2.53*

†Photons per 100 n captures*

J.T.Braid, BAPS 28, 1, J5(1953); *verbal report.

Capture γ's $Na^{23}(n,\gamma)$ sl pe⁻, Cpt

60†	0.475	20†	2.07
50†	0.877	30†	2.52
20†	1.75		

†Photons per 100 n captures*

M.T.Motz, BAPS 28, 1, J8(1953); *verbal report.

Na^{24} (11 13)

Neutron resonances E_n = 0.12 to 1
12 resonances, Γ's, J's

P.M.Stelson, W.M.Preston, Phys. Rev. 88, 1354 (1952).

Mg

Levels Mg(p,p) E_p = 8 s

3.54
4.71
5.03

M.J.Hausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

Mg^{24} (12 12)

Levels Mg(p,p) Al(p,α) E_p = 8 s

1.38
doublet 4.13
4.24

g.s. α group not observed

M.J.Hausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

Mg^{25} (12 13)

Levels Mg(p,p) E_p = 8 s

0.61	2.76	complex?
1.62	3.41	
1.98	3.91	
2.56		

M.J.Hausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

Mg^{26} (12 14)

Levels $Na^{23}(\alpha,p)$ $E_\alpha = 5.30$ ppl

0.40
1.72
2.72

E.Hjalmar, H.Slätis, Arkiv Fysik 4, 323(1952).

	γ		pγ scin
1.83 level	1.83		
2.97 level	1.14(6†)	2.97(1†)	1.83(6†)
3.97 level	2.14	3.97(vw)	1.83
4.35 level	1.38	1.14	1.83

J.E.May, B.P.Foster, BAPS 28, 1, S8(1953).

Levels Mg(p,p) s

1.83
2.96

M.J.Hausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

Al^{27} (13 14)

Levels Al(n,n) E_n = 2.4 scin

0.35 ?
~0.9

W.J.Poole, Phil. Mag. 43, 1060(1952).

Al^{28} (13 15)

Levels $Al^{27}(d,p)$ E_d ~8 pc

d,p(θ)

Level	l_n
g.s. doublet	0
(1.0)	0 (10%), 2 (90%)

J.R.Holt, T.N.Marsham, Proc. Phys. Soc. 65A, 763 (1952).

Al^{28} (13 15)

Levels	Al(d,p)		E_d = 2.1	s ppl
0.031	2.652	3.873	4.734	5.372
0.974	2.980	3.900	4.759	5.435
1.015	3.006	3.932	4.837	5.735
1.367	3.291	4.031	4.898	5.755
1.625	3.342	4.115	4.988	5.792
2.137	3.458	4.238	5.007	5.855
2.198	3.532	4.307	5.128	6.011
2.268	3.587	4.457	5.156	6.190
2.484	3.665	4.512	5.169	6.307
2.578	3.695	4.686	5.182	

Relative intensities given

H.A.Enge, W.W.Buechner, A.Sperduto, Phys. Rev. 88, 963(1952).

Al^{29} (13 16)

γ	85†	1.28	scin
	15†	2.43	

No 2.04γ (<4%)

H.Roderick, O.Lönsjö, W.E.Meyerhof, BAPS 28, 1, S9(1953).

Si^{28} (14 14)

Resonances $Mg^{24}(\alpha,p)Al^{27}$ $Al^{27}(p,\alpha)Mg^{24}$

Same Si^{28} levels observed in both reactions

Resonances $Mg^{24}(\alpha,\alpha)$ E_α = 2.7 to 3.4

S.G.Kaufmann, G.Goldberg, L.J.Koester, F.P.Mooring, Phys. Rev. 88, 673(1952).

Si^{29} (14 15)

Levels	Si(d,p)		E_d = 14.3
d,p(θ)	g.s.	l_n = 0	
	(1.29)	l_n = 2	

C.F.Black, BAPS 28, 1, W10(1953).

Si^{31} (14 17)

τ	2.62^h	
β^-	1.48	a

A.Wennerblom, K.E.Zimen, E.Ehn, Svensk Kem. Tid. 63, 207(1951).

τ	2.62^h	P(d,2p)	chem; ic

L.J.de Vries, F.T.M.Veringa, J.Clay, Koninkl. Ned. Akad. Wetenschap., Proc. 55B, 303(1952).

P^{29} (15 14)

τ	4.45^s	Si^{28}(2.8-Mev d)	
γ	0.5% (1.28)		scin
	2.5% (2.43)		

(1.28γ) (0.511γ) (2.43γ) (0.511γ)

No 0.39, 0.76, 1.15, or 2.04γ

H.Roderick, O.Lönsjö, W.E.Meyerhof, BAPS 28, 1, S9(1953).

P^{31} (15 16)

Neutron resonances P(n,p)2.6^{h}Si

E_n = 2.05 to 3.25

2.25	2.55	2.87	3.15
2.37	2.70	3.02 ?	3.22

I.Nilsson, Trans. Chalmers Univ. Technol., Gothenburg No. 125(1952).

P^{32} (15 17)

Levels	P^{31}(d,p)		E_d = 14.3
d,p(θ)	g.s.	l_n = 2	
	~1.2*	l_n = 0*	

C.F.Black, BAPS 28, 1, W10(1953); *verbal report.

P^{32} (15 17)

Levels	P^{31}(d,p)		E_d = 7.8	pc
d,p(θ)	g.s.	l_n = 2		
	(0.08)	l_n = 2		
	(0.52)	l_n = 0(22%),	2(78%)	
	(1.16)	l_n = 0(33%),	2(67%)	
	(1.3)	l_n = 0(57%),	2(43%)	

J.S.King, E.H.Beach, BAPS 28, 1, W9(1953); verbal report.

Capture γ's	P^{31}(n,γ)	2 crystal	scin s
37†	0.51		
17†	1.13		
41†	2.19		

†Photons per 100 n captures*

J.T.Braid, BAPS 28, 1, J5(1953); *verbal report.

P^{33} (15 18)

τ	25^d	S^{33}(n,p)	chem
β^-	0.246		a

No γ (<3.5%)

T.Westermark, Phys. Rev. 88, 573(1952).

S^{32} (16 16)

Levels	S^{32}(p,p)		E_p = 8	s
	2.25	4.50	5.04	
	3.81	4.74	5.83	
	4.32			

J.C.Arthur, A.J.Allen, R.S.Bender, M.J.Hausman, C.J.McDole, Phys. Rev. 88, 1291(1952); 87, 237A (1952).

S^{33} (16 17)

Levels	S(d,p)		E_d = 14.3
d,p(θ)	g.s.	l_n = 2	
	(0.79)	l_n = 0	

C.F.Black, BAPS 28, 1, W10(1953).

Capture γ's	S(n,γ)	2 crystal	scin s
60†	0.84		
	~1.52		
40†	2.34		

†Photons per 100 n captures*

J.T.Braid, BAPS 28, 1, J5(1953); *verbal report.

Cl^{34} (17 17)

τ	32.5^m	S(p,n)

N.M.Hintz, N.F.Ramsey, Phys. Rev. 88, 19(1952).

Cl^{36} (17 19)

Capture γ's	Cl(n,γ)	2 crystal	scin s
0.48	1.85*		
0.75	2.15*		
1.14	2.84		

J.T.Braid, BAPS 28, 1, J5(1953); *verbal report.

Capture γ's	Cl^{35}(n,γ)		scin
0.784	2.00		
1.15	6.2		
1.59	7.7		

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Level	Cl(d,p)		E_d = 8.9
d,p(θ)	g.s.	l_n = 2	

J.S.King, W.C.Parkinson, Phys. Rev. 88, 141(1952).

K^{40} 19 21

ϵ/β^- 0.06 ms of A

Based on $\tau_{total} = 1.27 \times 10^{8}$y; assumption of 4 sample ages of 1.03×10^{9}y

A.K.Mousuf, Phys. Rev. 88, 150(1952).

D_2 factor corrects F-K plot cc

J.M.Marshall, BAPS 28, 1, S10(1953).

$\Delta M(K^{40} - Ca^{40}) = 1.30 \pm 0.07$ Mev ms
$\Delta M(K^{40} - A^{40}) = 1.49 \pm 0.07$ Mev

W.M.Johnson, Jr., Phys. Rev. 88, 1213(1952).

K^{40} ? 19 21

Capture γ's K(n,γ) scin
6.0
8.2

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Ca^{40} 20 20

Level Ca(p,p) $E_p = 7.7$ a
3.8

J.A.Harvey, Phys. Rev. 88, 162A(1952).

Ca^{41} 20 21

Levels Ca(d,p) $E_d = 14.3$
d,p(θ) g.s. $l_n = 3$
(1.96) $l_n = 1$

C.F.Black, BAPS 28, 1, W10(1953); verbal report.

Ca^{41} ? 20 21

Capture γ's Ca(n,γ) scin
6.8
8.2

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Ca^{48} 20 28

$\tau_{\beta\beta}$ $> 10^{14}$y ppl

Assuming decay energy ≥ 2 Mev

J.M.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

Sc^{43} 21 22

τ 3.9^h
$\beta^+(+\epsilon)$ 28% 0.77 s
72% 1.18
γ 0.375 s pe$^-$

Weak 1.15γ probably in Sc^{44}

Ca^{43}(7-Mev p), Ca(20-Mev α) chem

J.R.Haskins, J.E.Duval, L.S.Cheng, J.D.Kurbatov, Phys. Rev. 88, 876(1952).

Sc^{46} 21 25

Level Sc^{45}(d,p) $E_d = 7.8$ pc
d,p(θ) g.s. ? $l_n = 1$ ($\leq 15\%$)*, 3 ($\geq 85\%$)

J.S.King, E.H.Beach, BAPS 28, 1, W9(1953); *verbal report.

Capture γ's Sc(n,γ) scin
0.152 ($20^s Sc^{46}$)
0.220
7 – 9 possible lines

No crossover of 0.152 and 0.220 γ's observed

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Sc^{48} 21 27

γ ~100† 0.99 scin pe$^-$
~100† 1.32

No 2.29 γ (< 0.1†)

W.W.Miller, Phys. Rev. 88, 516(1952).

Ti

Relative abundances $TiCl_4$; ms

A	46	47	48	49	50
%	7.87	7.25	73.9	5.56	5.43

M.C.Wattraw, C.F.Pachucki, AECU-1903(1952); NSA 6, 2526(1952).

Capture γ's Ti(n,γ) 2 crystal scin s
37† 0.33
~100† 1.4

†Photons per 100 n captures*

J.T.Braid, BAPS 28, 1, J5(1953); *verbal report.

Capture γ's Ti(n,γ) scin
1.38
5.0
6.5 – 7.0

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Ti^{47} 22 25

Levels Ti^{46}(d,p) 82.68% Ti^{46} pc

10†	g.s.	17†	3.09	
34†	1.40	50†	3.70	
13†	2.39	50†	4.18	
32†	2.64			

G.F.Pieper, Phys. Rev. 88, 1299(1952).

Ti^{48} 22 26

Levels* Ti^{47}(d,p) 82.06% Ti^{47} pc

10†	g.s.	150†	4.50
10†	1.33	180†	~4.9
< 50†	2.31	250†	~5.2
100†	3.31		

*Longest range p group observed may go to first excited and not g.s.

G.F.Pieper, Phys. Rev. 88, 1299(1952).

Ti^{49} 22 27

Levels Ti^{48}(d,p) 98.90% Ti^{48} pc

10†	g.s.	40†	2.41
90†	1.35	120†	3.11
60†	1.70		

G.F.Pieper, Phys. Rev. 88, 1299(1952).

Ti^{50} 22 28

Levels Ti^{49}(d,p) 77.27% Ti^{49} pc

10†	g.s.	240†	4.88
10†	1.58	190†	5.39
< 10†	3.0	330†	5.99
240†	4.14		

G.F.Pieper, Phys. Rev. 88, 1299(1952).

Ti^{51} 22 29

β^- 80% 1.9 V(n) Ti(d) chem; a,s
20% 2.2
γ 0.32 scin

(1.9β) (0.32γ)

L.Koester et al, Z. Phys. 133, 319(1952).

$_{22}Ti^{51}_{29}$ Levels $Ti^{50}(d,p)$ 84.69% Ti^{50} pc

10†	g.s.	8†	1.15?
3†	0.61		1.6?

G.F.Pieper, Phys. Rev. 88, 1299(1952).

No long lived Ti^{51} activity from Ti(th n),ms
Activity in Ti foil due to Ta^{182}, chem

W.Forsling, A.Ghosh, Arkiv Fysik 4, 331(1951).

$_{23}V^{48}_{25}$ β^+ ~95† 0.69 $Sc^{45}(\alpha,n)$ chem; sπ
~5† ~0.82

γ (0.99) scin
100† (1.32)
2† (2.22)

(0.511γ) (0.99γ) (0.511γ) (1.32γ) (0.511γ) (2.2γ)
(1.32γ) (0.99γ) No(0.99γ) (2.2γ) No(1.32γ) (2.2γ)
$\gamma\gamma(\theta)$ indicates I = 4, 2, 0

No ce$^-$ between 0.070 and 0.12

P.L.Roggenkamp, C.H.Pruett, R.G.Wilkinson, Phys. Rev. 88, 1262(1952).

γ ~100† 0.99 scin
~100† 1.32
1.7† 2.29

(0.99γ) (1.32γ) (0.99γ) (0.511γ)
(1.32γ) (0.511γ) (2.29γ) (0.511γ)

M.M.Miller, Phys. Rev. 88, 516(1952).

$_{23}V^{50}_{27}$ $\tau_{\beta\epsilon}$ $>10^{12y}$

S.G.Cohen, Bull. Research Council Israel 2, 195 (1952).

I 6 para

J.W.Baker, B.Bleaney, Proc. Phys. Soc. 65A, 952 (1952).

I 6 para

C.Kikuchi, W.H.Sirvetz, V.W.Cohen, Phys. Rev. 88, 142(1952).

$_{23}V^{51}_{28}$ I 7/2 para

C.Kikuchi, W.H.Sirvetz, V.W.Cohen, Phys. Rev. 88, 142(1952).

Levels V(p,p) E_p = 8 s

0.33	2.43	3.83
0.48	2.65	3.96
1.16	3.11	4.90
1.84	3.41	4.97
2.22	3.58	

No level at 0.267 by (p,p)

M.J.Nausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

$_{23}V^{52}_{29}$ Level $V^{51}(d,p)$ E_d = 7.8 pc
d,p(θ) g.s. l_n = 1 ($\geq$75%), 3($\leq$25%)

J.S.King, E.H.Beach, BAPS 28, 1, W9(1953).

$_{23}V^{52}_{29}$ Capture γ's V(n,γ) scin

5.3	6.8
5.7	7.4

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Cr Levels Cr(p,p) E_p = 8 s

0.48	3.20	3.80
0.81	3.46	3.99
2.69	3.51	4.07
2.79	3.65	4.78

M.J.Nausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

Capture γ's Cr(n,γ) scin

0.880	8.0 – 8.5
5 – 6	8.5 – 9.0

Spectrum very complex at high energies

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

$_{24}Cr^{51}_{27}$ γ 21% (0.32) α_K = 0.0015 M1 pc, scin
No 0.267 γ

D.Maeder, P.Preiswerk, A.Steinemann, Helv. Phys. Acta 25, 461(1952).

$_{24}Cr^{52}_{28}$ Levels Cr(p,p) E_p = 8 s

1.45
2.43
2.99

Assignment from agreement with Mn^{52} decay

M.J.Nausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

$_{24}Cr^{53}_{29}$ I 3/2 para
$|\mu|$ 0.58

K.D.Bowers, Proc. Phys. Soc. 65A, 860(1952).

Level Cr(d,p) E_d = 14.3
d,p(θ) g.s. l_n = 1

C.F.Black, BAPS 28, 1, W10(1953).

$_{24}Cr^{53}_{29}$? 23 α tracks from Fe(th n) E_α~5 ppl

J.P.Longchamp, J. phys. radium 13, 333(1952).

$_{24}Cr^{54}_{30}$ $\tau_{\beta\beta}$ $>6\times10^{15y}$ ppl
Assuming decay energy $\geq$2 Mev

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

$_{24}Cr^{55}_{31}$ τ 3.52^m Cr(n,γ) Mn(n,p) chem
β^- 2.85 a
No γ (< 10%)

A.Flammersfeld, W.Herr, Z. Naturforsch. 7a, 649 (1952).

Mn^{55} (25 30)

Levels — $Mn^{55}(p,p)$ — E_p = 8 — s

0.13	2.27	3.05
1.00	2.42	3.21
1.30	2.59	3.31
1.56	2.77	3.42
1.91	2.85	3.64

H.J.Hausman, A.J.Allen, J.S.Arthur, R.S.Bender, C.J.McDole, Phys. Rev. 88, 1296(1952).

Mn^{56} (25 31)

γ 100† 1.81 $\alpha_{pair}=5.6\times10^{-4}$ E1 sl
100† 2.13 $\alpha_{pair}=4.6\times10^{-4}$ E2? pe^-

H.Slätis, K.Siegbahn, Arkiv Fysik 4, 485(1952).

Capture γ's — $Mn^{55}(n,\gamma)$ — scin

0.090	5.0
0.190	7.2

No crossover of 0.090 and 0.190 γ's observed

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Fe

Capture γ's — $Fe(n,\gamma)$

0.425
8.5

Isotopic assignment uncertain

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Fe^{56} (26 30)

Level — $Fe(n,n)$ — E_n = 2.4 — scin

(0.85)

M.J.Poole, Phil. Mag. 43, 1060(1952).

Fe^{57} (26 31)

Levels — $Fe(d,p)$ — E_d = 14.3

$d,p(\theta)$ g.s. l_n = 1
~1.4 l_n = 1
~2.6 l_n = 1

C.F.Black, BAPS 28, 1, M10(1953).

Capture γ's — $Fe(n,\gamma)$

6.0
7.4

Assignment from intensities
No line at 1.4 observed

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Fe^{58} (26 32)

$\tau_{\beta\beta}$ $>3\times10^{14}$ y — ppl

Assuming decay energy $\geq$2 Mev

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

Fe^{59} (26 33)

γ (1.10) $\alpha=1.8\times10^{-4}$ s ce^-
(1.30) $\alpha=1.1\times10^{-4}$

G.Hinman, D.Brower, R.Leamer, BAPS 28, 1, S7 (1953).

β^-	46%	0.27	F-K plot linear	sl
	54%	0.462	F-K plot linear	
	0.3%	1.560	F-K plot not a or D_2	
γ	2.8%	0.191	$\alpha=7\times10^{-3}$	M1
	57%	1.098	$\alpha=1.8\times10^{-4}$	M1
	43%	1.289	$\alpha=1.4\times10^{-4}$	E2

(0.19γ)(1.1γ) Fe^{58}(pile n,γ); sl ce^-, pe^-
$\gamma\gamma(\theta)$ agrees with I = 3/2, 5/2, 7/2 — scin

F.R.Metzger, Phys. Rev. 88, 1360(1952).

Co

Neutron resonance — E_n = 1 ev to 5 kev
123 ev $\sigma_o\Gamma^2=2.1\times10^3$

A.W.Merrison, E.R.Wiblin, Proc. Roy. Soc. 215A, 278(1952).

Co^{56} (27 29)

β_1^+ ~3† 0.995 Mn^{55}(20-Mev α) chem; s
β_2^+ ~8† 1.53

L.S.Cheng, J.L.Dick, J.D.Kurbatov, Phys. Rev. 88, 887(1952).

Co^{57} (27 30)

β^+ 0.320 Mn^{55}(20-Mev α) chem; s

γ

	α_K	K/L	
<0.018			s ce^-_L
0.119	~0.7	~6.3	M2,E3 ce^-_K
0.133	~0.7	~5.2	E3 pe^-

L.S.Cheng, J.L.Dick, J.D.Kurbatov, Phys. Rev. 88, 887(1952).

Co^{58} (27 31) 72[d]

|1|1 — 3.5* — $\gamma(\theta,T)$
0.805γ is not dipole — $\gamma(\theta,T)$
*Based on I = 2

J.W.Daniels, M.A.Grace, H.Halban, N.Kurti, F.N.H. Robinson, Phil. Mag. 43, 1297(1952).

β^+ 0.472 Mn^{55}(20-Mev α) chem; s
γ (0.805) $\alpha_K=2.9\times10^{-4}$ E2 ce^-, pe^-

L.S.Cheng, J.L.Dick, J.D.Kurbatov, Phys. Rev. 88, 887(1952).

γ (0.805) Electric multipole
Polarization from low temp. aligned nuclei

G.R.Bishop, J.W.Daniels, G.Goldschmidt, H.Halban, N.Kurti, F.N.H.Robinson, Phys. Rev. 88, 1432 (1952).

Co^{60} (27 33) 10.7[m]

γ 0.059 α_K = 35 — pc, scin

J.M.Kahn, ORNL-1089(1951).

5.2[y]

|1|1 — 3.5 — $\gamma(\theta,T)$
Value of 3.0 (Phys. Rev. 85, 688.) in error

B.Bleaney et al., quoted by J.W.Daniels et al., Phil. Mag. 43, 1297(1952).

γ (1.17) Electric multipole
(1.33) Electric multipole
Polarization from low temp. aligned nuclei

G.R.Bishop, J.W.Daniels, G.Goldschmidt, H.Halban, N.Kurti, F.N.H.Robinson, Phys. Rev. 88, 1432 (1952).

(1.17γ)/(1.33γ) = 0.98 ± 0.04 — s^{77} Cpt

B.S.Dzhelepov et al, Doklady Akad. Nauk USSR 77, 233(1951); NSA 5, 6510(1951).

$\gamma\gamma(\theta)$, $\gamma\gamma$ polarization-direction — scin
I = 4^+, 2^+, 0^+

R.W.Kloepper, E.S.Lennox, M.L.Wiedenbeck, Phys. Rev. 88, 695(1952).

$^{27}Co^{60}$ 33 — Capture γ's — Co(n,γ) — scin

0.220	5.8
1.1	7.0
1.5	

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Ni — Relative abundances — Ni(CO)$_4$; ms

A	58	60	61	62	64
%	68.0	26.3	1.13	3.66	1.01

H.C.Wattraw, C.F.Pachucki, AECU-1903(1952); NSA 6, 2526(1952).

$^{28}Ni^{64}$ 36 — $\tau_{\beta\beta}$ $> 3 \times 10^{15}$ y — ppl
Assuming decay energy $\geq$ 2 Mev

J.M.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

Cu — Capture γ's — Cu(n,γ) — scin

0.150
6.5 – 7
7 – 8

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

$^{29}Cu^{62}$ 33 — τ 9.80^m

J.Goldenberg, M.D.Sousa-Santos, E.Silva, Ciencid cultura 3, 307(1951); Chem. Abst. 46-10926(1952).

$^{29}Cu^{64}$ 35 — $\beta^+\gamma$? No $\beta^-\gamma$

S.Meric, Istanbul Üniv. Fen Fakült. Mecmuasi 16A, 51(1951).

Zn — Capture γ's — Zn(n,γ) — scin

1.0
7.5

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

$^{30}Zn^{70}$ 40 — $\tau_{\beta\beta}$ $> 10^{15}$ y
Assuming decay energy $\geq$ 2 Mev

J.M.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

Ga — Neutron resonances — E_n = 5 ev to 5 kev

94 ev
290 ev

A.W.Merrison, E.R.Wiblin, Proc. Roy. Soc. 215A, 278(1952).

$^{31}Ga^{67}$ 36 — γ (0.092) $\tau \sim 10^{-6}$ s
(0.18γ) (0.30γ)

S.C.Fultz, R.J.Nash, R.L.Woodward, Phys. Rev. 88, 170A(1952).

$^{31}Ga^{72}$ 42 — γ 64† 2.491 ± 0.002 s $\pi\sqrt{2}$ pe$^-$
100† 2.508 ± 0.002

A.Hedgran, D.Lind, Arkiv Fysik 5, 177(1952).

$^{32}Ge^{75}$ 43 ^{48}s — τ_1 48^s — As^{75}(n,p) Ge^{74}(n,γ)
γ 0.175 scin

A.B.Smith, R.S.Caird, A.C.G.Mitchell, Phys. Rev. 88, 150(1952).

$^{32}Ge^{75}$ 43 ^{82}m — β^- 15% 0.614 Ge^{74}(n,γ); sl
85% 1.137
γ 0.265 sl pe$^-$,scin
0.408 sl ce$^-$,scin
0.572 sl Cpt,scin
No (1.137β^-)(γ)

A.B.Smith, R.S.Caird, A.C.G.Mitchell, Phys. Rev. 88, 150(1952).

$^{32}Ge^{76}$ 44 — $\tau_{\beta\beta}$ $> 2 \times 10^{18}$ y — ppl
Assuming decay energy $\geq$ 2 Mev

J.M.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

$^{33}As^{76}$ 43 — β^- 3% 0.48 As(pile n); s $\pi\sqrt{2}$
12% 1.76
33% 2.40
52% 2.98 $\Delta I = 2$, yes shape
γ 0.558 α_K = 0.002 ce$^-$

E.P.Tomlinson, S.L.Ridgway, Phys. Rev. 88, 170A(1952), verbal report.

$^{34}Se^{77}$ 43 ^{17}s — γ 0.16 Se(fast n); sl ce$^-$

J.Orring, Arkiv Fysik 4, 469(1952).

γ 0.13 Se(pile n); pc, scin

J.M.Kahn, ORNL-1089(1951).

$^{35}Br^{79}$ 44 — $q(Br^{79})/q(Br^{81})$ = 1.1987 Solid $C_6H_4Br_2$ Mic

E.Wanring, C.Brown, D.Williams, BAPS 28, 1, F4, (1953).

$^{35}Br^{82}$ 47 — γ 368† 0.535 s
0.602
353† 0.750
100† 1.02
85† 1.29
40† 1.45

B.Dzhelepov, A.Silant'ev, Doklady Akad. Nauk SSSR. 85, 533(1952); NSA 6-6197(1952).

$^{35}Br^{84}$ 49 — γ st 0.890 scin
w 1.89

L.M.Langer, R.B.Duffield, Quoted by C.M.Huddleston, A.C.G.Mitchell, Phys. Rev. 88, 1350(1952).

$^{36}Kr^{83}$ 47 — τ 1.86^h

L.J.de Vries, F.T.H.Veringa, J.Clay, Koninkl. Ned. Akad. Wetenschap., Proc. 55B, 303(1952).

$^{36}Kr^{85}$ 49 $^{4.4}$h — β^- 85% 0.83 Kr(n,γ) U(n,f) ms; sl
γ 85% 0.1495 α_K = 0.041 M1 ce$^-$
γ I.T. 15% 0.3050 K/LM = 7
[β] [e^-_K(0.15γ)]

I.Bergström, Arkiv Fysik 5, 191(1952).

10^y — β^- 0.666 $\Delta I = 2$, yes shape sl
Kr(n,γ) U(n,f) ms

I.Bergström, Arkiv Fysik 5, 191(1952).

$_{36}Kr^{88}_{52}$

β^- 68% 0.52 U(n,f) ms; sl
12% 0.9 ?
20% 2.7 a$\beta\gamma$; sl
γ 0.028 K/LM = 8
[e^-_K(0.028γ)] [~0.5β]; e^-/β = 0.085

S.Thulin, Arkiv Fysik 4, 363(1952).

$_{37}Rb^{82}_{45}$

β^+ 24† 0.175 Br(< 20-Mev α); sl
76† 0.775
γ 0.188 0.464 0.818 ce$^-$, pe$^-$
0.248 0.550 1.020
0.322 0.610 1.314
0.389 0.690 1.464
0.423 0.768 v st

C.W.Huddleston, A.C.G.Mitchell, Phys. Rev. 88, 1350(1952).

$_{37}Rb^{84}_{47}$

β^+ ~3† 0.37 ? Br(<20-Mev α); sπ, sl
58† 0.82
39† 1.629 $\Delta I = 2$, yes shape
γ 0.890 scin, sπ,ce$^-$
No other γ No β^- (vw if present)
(~0.8β^+)(γ) No (1.63β^+)(γ)

C.W.Huddleston, A.C.G.Mitchell, Phys. Rev. 88, 1350(1952).

$_{37}Rb^{86}_{49}$

$\beta\gamma$ polarization - direction
1.08γ no parity change

D.R.Hamilton, A.Lemonick, F.W.Pipkin, BAPS 28, 1, 54(1953); verbal report.

$_{37}Rb^{87}_{50}$

τ 5.90×10^{10} y RbI(Tl) scin
β^- 0.275 F-K plot not linear
No ce$^-$ or γ

G.W.Lewis, Phil. Mag. 43, 1070(1952).

τ $\geq 4.8 \times 10^{10}$ y
No βe^- 4π counter

I.Bähnisch, E.Huster, W.Walcher, Naturwiss. 39, 379(1952).

$_{37}Rb^{88}_{51}$

τ 17.7^m d 2.7^{h}Kr; sl
β^- 13% 2.5 $\Delta I = 2$, yes shape
9% 3.6
78% 5.3

S.Thulin, Arkiv Fysik 4, 363(1952).

$_{38}Sr^{87}_{49}$ 2.7^h

τ 2.88^h Sr(d) d 80^{h}Y chem
γ 0.3882 K/LM = 5.8 s

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

$_{38}Sr^{88}_{50}$

$\tau_{\beta\beta}$ $> 3 \times 10^{16}$ y ppl
Assuming decay energy $\geq$ 2 Mev

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

$_{39}Y^{82}_{43}$

τ ~70^m Y(130-Mev p) p 26^{d}Sr chem

A.A.Caretto, Jr., E.O.Wiig, J. Am. Chem. Soc. 74, 5235(1952).

$_{39}Y^{83}_{44}$

τ 3.5^h Y(130-Mev p) p 38^{h}Sr chem

A.A.Caretto, Jr., E.O.Wiig, J. Am. Chem. Soc. 74, 5235(1952).

$_{39}Y^{85}_{46}$

τ 5^h Y(130-Mev p) p 65^{d}Sr chem

A.A.Caretto, Jr., E.O.Wiig, J. Am. Chem. Soc. 74, 5235(1952).

$_{39}Y^{87}_{48}$ 14^h

γ 0.3813 K/LM = 5.4 s
No ce$^-$ in region above 1 Mev

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

80^h γ 0.4834 K/LM ~ 7 s

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

$_{39}Y^{88}_{49}$

γ (0.91) $\alpha_K = 3.4 \times 10^{-4}$ E1
(1.85) $\alpha_K = 1.7 \times 10^{-4}$ E1,M2

F.R.Metzger, H.C.Amacher, Phys. Rev. 88, 147 (1952).

$_{39}Y^{91}_{52}$ 51^m

γ 0.5512 K/LM = 6.0 s

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

$_{41}Nb^{92}_{51}$

No β^- Nb^{93}(20-Mev p) chem; a,s
γ ~100† 0.933 scin
1† 1.84

H.K.Ticho, D.Green, J.R.Richardson, Phys. Rev. 86, 422(1952); 87, 195A(1952); priv. comm.

$_{41}Nb^{94}_{53}$ 6.6^m

γ (0.042) $\alpha_K > 100$ Nb(pile n); pc

J.H.Kahn, ORNL - 1089(1951).

$_{41}Nb^{95}_{54}$ 90^h

γ (0.22) K/LM = 2.5 sl ce$^-$

V.S.Shpinel, Zhur. Eksptl' i Teoret. Fiz. 22, 255(1952); Phys. Abst. 55-8254(1952).

Mo Neutron resonances (ev) E_n = 1 ev to 10 kev
46.3 $\sigma_o \Gamma^2 = 400$
75
140
~440

E.R.Hodgson, J.F.Gallagher, E.M.Bowey, Proc. Phys. Soc. 65A, 992(1952).

$_{42}Mo^{93}_{51}$ 6.7^h

τ_1 6.95^h Nb(p,n) chem, rel σ
γ ~ 60† 0.290 scin
~100† 0.690
~100† 1.464

G.E.Boyd, R.A.Charple, Phys. Rev. 88, 681(1952).

$_{42}Mo^{100}_{58}$

$\tau_{\beta\beta}$ $\geq 10^{15}$ y ppl
Assuming decay energy $\geq$ 2 Mev
Definite evidence of activity

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

Ru^{99}_{44} $_{55}$

I 5/2 para
$\mu(Ru^{101})/\mu(Ru^{99}) = 1.09$

J.H.E.Griffiths, J.Owen, Proc. Phys. Soc. 65A, 951(1952).

Ru^{101}_{44} $_{57}$

I 5/2 para
$\mu(Ru^{101})/\mu(Ru^{99}) = 1.09$

J.H.E.Griffiths, J.Owen, Proc. Phys. Soc. 65A, 951(1952).

Rh

Neutron resonance (ev) cryst s
1.260

H.H.Landon, V.L.Sailor, H.L.Foote, Jr., BAPS 28, 1, M8(1953).

Rh^{99}_{45} $_{54}$

γ 0.286 Ru(p); s π ce$^-$

S.C.Fultz, R.J.Nash, R.L.Woodward, M.L.Pool, Phys. Rev. 88, 170A(1952).

Rh^{101}_{45} $_{56}$

γ 0.144 Ru(p); s π ce$^-$
0.286
No β^+

S.C.Fultz, R.J.Nash, R.L.Woodward, M.L.Pool, Phys. Rev. 88, 170A(1952).

Rh^{104}_{45} $_{59}$ 4.3^m

γ 0.052 $\alpha \sim 25$ pc, scin

J.M.Kahn, ORNL-1089(1951).

Rh^{104}_{45} $_{59}$

Capture γ's Rh(n,γ) scin
0.080
0.160

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Pd^{105}_{46} $_{59}$

I 5/2 ? s
μ -0.57

A.Steudel, Z.Phys. 132, 429(1952).

Pd^{109}_{46} ? $_{63}$ 4.8^m

τ 5^m Pd(pile n)
γ 0.17 $\alpha \sim 1$ scin

J.M.Kahn, ORNL-1089(1951).

Ag

Neutron resonance (ev) cryst s
5.24

H.H.Landon, V.L.Sailor, H.L.Foote, Jr., BAPS 28, 1, M8(1953).

Neutron resonances (ev) E_n = 12 ev to 5 kev

5.15 ± 0.03		52
15.9	$\sigma_o\Gamma^2 = 23$	66
29.6		125
40		

A.W.Merrison, E.R.Wiblin, Proc. Roy. Soc. 215A, 278(1952).

Neutron resonances (ev) E_n = 15 to 100 ev

16.5	40	52	71
30.7	43	56	88

J.S.Levin, W.Y.Kato, N.G.Sjostrand, D.J.Hughes, BAPS 28, 1, M10(1953); verbal report.

Ag^{104}_{47} $_{57}$

τ 27^m d 59^mCd
β^+ 2.70 s π
γ 0.555

Number of weaker γ's tentatively assigned to Ag^{104}

F.A.Johnson, Proc. Roy. Soc. Canada 46, 135A (1952).

Ag^{110} ? $_{47}$ $_{63}$

Capture γ Ag(n,γ) scin
0.187

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Cd^{104}_{48} $_{56}$

τ 59^m Ag(50-Mev p) chem
β^+ 0.93 s π
γ 0.0666
0.0835
w 0.1498

F.A.Johnson, Proc. Roy. Soc. Canada 46, 135A (1952).

Cd^{105}_{48} $_{57}$

τ 55^m Ag(35-Mev p) chem
β^+ 1.68 s π
γ 0.0254 (K x ray?)
2.1

F.A.Johnson, Proc. Roy. Soc. Canada, 46, 135A (1952).

Cd^{114}_{48} $_{66}$

Capture γ's Cd^{113}(n,γ) s π ce$^-$
0.097
0.562

C.T.Hibdon, C.O.Muehlhause, Phys. Rev. 88, 943 (1952); 87, 222A(1952).

Capture γ's Cd(n,γ) sl pe$^-$

89^{+*}	0.555	11^{+*}	0.80
25^{+*}	0.646	20^{+*}	1.30

$^+$Photons per 100 n captures

H.T.Motz, BAPS 28, 1, J8(1953); *verbal report.

Capture γ's Cd(n,γ) scin
0.558
8.5

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

Capture γ's Cd(n,γ) pair s

0.36^+	6.82	0.12^+	7.84
0.21^+	7.67	0.23^+	8.48
0.16^+	7.73	0.14^+	9.05

$^+$Photons per 100 n captures

G.A.Bartholomew, B.B.Kinsey, BAPS 28,1, J6(1953).

Cd^{116}_{48} $_{68}$

$\tau_{\beta\beta}$ $> 8 \times 10^{15}$ y ppl
Assuming decay energy $\geq$ 2 Mev

J.H.Fremlin, M.C.Walters, Proc Phys. Soc. 65A, 911(1952).

Cd^{117}_{48} $_{69}$

τ 2.9 h Cd(d,p) chem
γ 1.2 a

A.H.W.Aten, Jr., W.Boelhouwer, Physica 18, 651 (1952).

$In^{111}_{49\ 62}$

γ 0.1708 K/LM = 7.0 s
0.2456 K/LM = 4.8

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

$In^{113}_{49\ 64}$ 1.7^h

γ 0.3917 K/LM = 4.2 s

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

$In^{114}_{49\ 65}$ 50^d

γ 0.1898 K/LM = 1.00 s

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

72^s $\gamma\gamma(\theta)$; I = 2,2,0 or 4,2,0 50^d In metallic
γ cascade follows ϵ decay of 72^s state

R.M.Steffen, W.Zobel, Phys. Rev. 88, 170A(1952).

$In^{115}_{49\ 66}$ 4.5^h

γ 0.3346 K/LM = 3.8 s

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

In^{116} ? $_{49\ 67}$

Capture γ's In(n,γ) scin
0.160
0.256
No crossover observed

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

$Sn^{124}_{50\ 74}$

$\tau_{\beta\beta}$ $> 2 \times 10^{15}$ y ppl
Assuming decay energy $\geq$2 Mev

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

$Sb^{122}_{51\ 71}$ 3.5^m

γ 0.059 α(0.059γ ?)~25
0.074 Sb^{121}(pile n); pc

J.M.Kahn, ORNL-1089(1951).

$Sb^{124}_{51\ 73}$ 60^d

β^- (0.95) ΔI = 2, yes shape? sl
2.27 ΔI = 2, yes shape

γ (0.607) $\frac{\alpha_K}{0.0036}$ $\frac{K/L}{7.1}$ E2
(1.7) $\leq 5 \times 10^{-4}$

D.R.Hutchinson, M.L.Wiedenbeck, Phys. Rev. 88, 699(1952).

γ	154^+	0.60	17^+	1.35	s π Cpt
	19^+	0.71	100^+	1.69	
	6.6^+	0.96	10^+	2.07	
	4.4^+	1.05			

K.Gromov et al., Doklady Akad. Nauk SSSR 86, 255(1952).

γ 1.692 sl pe^-

D.E.Alburger, Phys. Rev. 88, 1257(1952).

No $\gamma\gamma(\theta)$, no $\gamma\gamma$ polarization-direction scin
(2.27β^-)(0.60γ)(θ), polarization-direction
I = 3, 2^+, 0^+

R.M.Kloepper, E.S.Lennox, M.L.Wiedenbeck, Phys. Rev. 88, 695(1952).

$Sb^{124}_{51\ 73}$ 60^d

(2.27β^-)(0.60γ) polarization-direction
0.60γ no parity change

D.R.Hamilton, A.Lemonick, F.W.Pipkin, BAPS 28, 1, 54(1953).

(0.60γ)(2.27β) Sb(pile n); scin
(0.60γ)(1.70γ) (0.60γ)(2.06γ) ?
(0.60γ)(0.65γ and/or 0.73γ)

S.A.E.Johansson, S.Almquist, Arkiv Fysik 5, 427 (1952); Nature 170, 583(1952).

Te^{124} ? $_{52\ 72}$

Capture γ Te(n,γ) scin
0.609

S.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

$Te^{130}_{52\ 78}$

$\tau_{\beta\beta}$ $> 4 \times 10^{15}$ y ppl
Assuming decay energy $\geq$2 Mev

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

$Te^{131}_{52\ 79}$ 25^m

τ		24.8^m	Te(n,γ)	chem
β^-	45%	1.35		a$\beta\gamma$
	55%	2.0		a
γ	30↑	0.16		a
	20↑	0.7		

$\gamma\gamma$ $\beta\gamma$

K.Geiger, Z. Naturforsch. 7a, 579(1952).

I Neutron resonances (ev) E_n = 5 ev to 5 kev
19.4 $\sigma_o\Gamma^2$ = 23
29.6
43

A.W.Merrison, E.R.Wiblin, Proc. Roy. Soc. 215A, 278(1952).

$I^{121}_{53\ 68}$

τ 1.5^h d 40^mXe, p 17^dTe

B.Dropesky, E.O.Wiig, Phys. Rev. 88, 683(1952).

$I^{122}_{53\ 69}$

τ 3.4^m d 20^hXe

B.Dropesky, E.O.Wiig, Phys. Rev. 88, 683(1952).

$I^{125}_{53\ 72}$

γ 0.0354 d 18^hXe; sl ce^-
Auger $e^-/(e^-_L + e^-_M$ of 0.035γ) = 1.3
shows ϵ chiefly to 0.035 level

I.Bergström, Arkiv Fysik 5, 191(1952).

$I^{131}_{53\ 78}$

γ sl pe^-, ce^-

		α_K*	K/LM	
6↑	(0.284)	0.05	3.3	E2
100↑	(0.364)	0.02	5.6	E2
10↑	(0.638)	α = 0.004		E2
3↑	(0.723)	α = 0.003		E2

*Based on α_K = 0.097 for 0.662γ of Cs^{137}

J.R.Haskins, J.D.Kurbatov, Phys. Rev. 88, 884 (1952).

I^{131} 53 78

(0.080γ) (0.284γ) No other γγ scin

S.Almqvist, S.A.E.Johansson, Nature 170, 583 (1952).

Xe^{121} 54 67

τ 40^m p 1.5^hI, I(240-Mev p) chem

B.Dropesky, E.O.Wiig, Phys. Rev. 88, 683(1952).

τ 70^m I(80-Mev p) chem

D.E.Tilley, Proc. Roy. Soc. Canada 46, 135A(1952).

Xe^{122} 54 68

τ 20^h p 3.4^mI, I(240-Mev p) chem

B.Dropesky, E.O.Wiig, Phys. Rev. 88, 683(1952).

τ 19.5^h p 3.4^mI, I(80-Mev p) chem

D.E.Tilley, Proc. Roy. Soc. Canada 46, 135A(1952).

Xe^{123} 54 69

τ 1.7^h p 13^hI, I(240-Mev p) chem

B.Dropesky, E.O.Wiig, Phys. Rev. 88, 683(1952).

Xe^{123} 54 69

τ 2.1^h I(50-Mev p) chem

D.E.Tilley, Proc. Roy. Soc. Canada 46, 135A(1952).

Xe^{125} 54 71

τ 18.0^h Xe(pile n) ms

ε from ratio of Auger e⁻ to ce^-_K

γ	68*	0.054	K/LM = 4.2 sl,
	1*	0.096	K/LM = 5 ce^-
	1*	0.106	K/LM = 5
	24*	0.187	K/LM = 4.5
	7*	0.243	K/LM = 7
	vw	0.46	scin

*Relative intensity of ce^-_K

I.Bergström, Arkiv Fysik 5, 191(1952).

Xe^{127} 54 73 34^d

τ 25^d Xe(pile n) ms

ε from ratio of Auger e⁻ to ce^-_K

γ	34*	0.057	K/LM = 6.2 sl,
	21*	0.145	ce^-
	41*	0.170	
	84*	0.2026	K/LM = 4.7 sπ/2
	vw	0.365	scin

*Relative intensity of ce^-_K

I.Bergström, Arkiv Fysik 5, 191(1952).

Xe^{131} 54 77 12^d

τ 12.0^d d 8^dI ms

γ 0.1639 α_K = 36 M4 sπ/2

K/L = 2.3 L/M = 2.9

I.Bergström, Arkiv Fysik 5, 191(1952).

stable

q −0.12 S

μ +0.683 S

A.Bohr, J.Koch, E.Rasmussen, Arkiv Fysik 4, 455 (1952).

Xe^{133} 54 79 5.3^d

τ 5.4^d Xe(pile n) U(n,f) ms

β⁻ 0.347 sl

γ 0.081 α_K = 1.6 M1

K/LM = 4.9

[e^-(0.08γ)] [β]

I.Bergström, Arkiv Fysik 5, 191(1952).

Xe^{135} 54 81 9.2^h

τ 9.2^h Xe(pile n) U(n,f) ms

β⁻ 0.91 sl

γ 100† 0.25 α_K = 0.054 M1,E2

K/LM = 6.5 sl ce^-, scin

6† 0.61 scin

[e^-(0.25γ)] [β]

0.053, 0.148, 0.190 γ's not found

I.Bergström, Arkiv Fysik 5, 191(1952).

Cs^{128} 55 73

τ 3.8^m d 2.4^dBa chem

β⁺ observed with 2.4^dBa belongs to this daughter

M.Lindner, R.N.Osborne, Phys. Rev. 88, 1422(1952).

Cs^{134} 55 79 2.3^y

β⁻ 22% 0.085*

6% 0.28*

9% 0.42*

65% 0.65*

Cs(slow n); s

γ 137† (~0.58) 3† 1.15 s pe^-

100† 0.788 3† 1.35

~2† ~1.0

K.Gromov, B.Dzhelepov, Doklady Akad. Nauk SSSR 85, 299(1952). *N.Anton'eva et al., Ibid.

γγ(θ), γγ polarization-direction scin

I = 4+, 2+, 0+

R.M.Kloepper, E.S.Lennox, M.L.Wiedenbeck, Phys. Rev. 88, 695(1952).

γγ polarization correlation observed

Consistent with 5±, 4+, 2+, 0+

B.L.Robinson, L.Madansky, Phys. Rev. 88, 1065 (1952).

Cs^{135} 55 80

β⁻ 0.210* ΔI = 2, no shape s

L.Lidofsky, E.Alperovitch, C.S.Wu, BAPS 28, 1, 22(1953); *verbal report.

Cs^{137} 55 82

γ 0.6614 K/LM = 4.6 s

G.A.Graves, L.W.Langer, R.D.Moffat, Phys. Rev. 88, 169A and 344(1952).

γ 0.66165 ±0.00015 sπ/2 ce^- pe^-

G.Lindström, K.Siegbahn, A.H.Wapstra, Proc. Phys. Soc. 66B, 54(1953).

γ 0.66160 ±0.00014 cryst

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

Ba^{127} 56 71

τ 12^m p 5.5^hCs, Cs(190-Mev d)

M.Lindner, R.N.Osborne, Phys. Rev. 88, 1422(1952).

Ba^{128} 56 72

ε ~100% Cs(190-Mev d) chem

β⁺ in 3.8^mCs daughter

M.Lindner, R.N.Osborne, Phys. Rev. 88, 1422(1952).

$_{56}Ba^{131}_{75}$

γ					Ba(pile n); s
			α_K	K/LM	
		0.043			ce⁻
		0.065		~3.5	
		0.108		~7	
		0.122		6.0	
	10†	0.214	~0.18	2.8	E2 ce⁻,pe⁻
	4†	0.241			
	7†	0.370	~0.010		E1
	100†	0.494	~0.0045	2.5	E2

W.W.Elliott, L.S.Chen, J.R.Haskins, J.D.Kurbatov, Phys. Rev. 88, 263(1952).

$_{56}Ba^{138}_{82}$

$\tau_{\beta\beta}$ $>10^{15}$y ppl

Assuming decay energy ≥ 2 Mev

J.M.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

$_{57}La^{140}_{83}$

γ	0.3286 ± 0.0003		sπ↓2 pe⁻
	0.4867 ± 0.0004		
	0.8151 ± 0.0007		
	1.596 ± 0.002		

A.Hedgran, D.Lind, Arkiv Fysik 5, 177(1952).

Capture γ La(n,γ) scin

4.5

B.Hamermesh, V.Hummel, Phys. Rev. 88, 916(1952).

$_{58}Ce^{143}_{85}$

β^-	100†	0.71	Ce^{142}(pile n,γ),
	133†	1.090	U(pile n,f) chem
	100†	1.390	
γ	~20†	0.126	sl pe⁻, scin
		~0.160	
	100†	0.290	
	~20†	0.356	
	~25†	0.660	
		0.72	

Unresolved lower energy β

(0.126γ) (0.160γ)

W.H.Burgus, Phys. Rev. 88, 1129(1952).

$_{59}Pr^{141}_{82}$

I 5/2 para

C.F.Davis et al, Atti accad. nazi. Lincei, Classe sci. fis. mat. e nat. 11, 77(1951). NSA 6-3679.

$_{61}Pm^{142}$? $_{81}$

τ 260^d Nd^{142}(7-Mev p)

J.K.Long, M.L.Pool, D.N.Kundu, Phys. Rev. 88, 171A(1952).

$_{61}Pm^{143}$? $_{82}$

τ 320^d Nd^{143}(7-Mev p)

J.K.Long, M.L.Pool, D.N.Kundu, Phys. Rev. 88, 171A(1952).

$_{61}Pm^{145}$? $_{84}$

τ 16^d Nd^{145}(7-Mev p)

β^+ 0.45

J.K.Long, M.L.Pool, D.N.Kundu, Phys. Rev. 88, 171A(1952).

$_{61}Pm^{146}_{85}$

τ ~2y Nd^{146}(7-Mev p)

β^- 0.75

J.K.Long, M.L.Pool, D.N.Kundu, Phys. Rev. 88, 171A(1952).

$_{62}Sm^{150}_{88}$

Capture γ's Sm^{149}(n,γ) sπ ce⁻

0.337	K/L~4.4
0.440	K/L~3

C.T.Hibdon, C.O.Muehlhause, Phys. Rev. 88, 943 (1952); 87, 222A(1952).

$_{62}Sm^{151}_{89}$

β^-	~0.075	Sm(th n); pc
γ	0.019	pc
(0.019γ) (β^-)		scin

H.W.Wilson, G.W.Lewis, Proc. Phys. Soc. 65A, 656 (1952).

$_{63}Eu^{155}_{92}$

β^-	~0.150	Sm(th n,$\gamma\beta^-$); pc
	~0.250	
γ	0.015	pc
(~0.150β^-) (γ)	(β^-) (0.015γ)	

H.W.Wilson, G.W.Lewis, Proc. Phys. Soc. 65A, 656 (1952).

$_{64}Gd^{153}_{89}$

γ 0.1037 K/L = 5 sπ ce⁻

No other γ Gd(pile n)

J.M.Cork, J.M.LeBlanc, W.H.Nester, F.B.Stumpf, Phys. Rev. 88, 685(1952).

$_{64}Gd^{156}$ ^{158}

Capture γ's Gd(n,γ) sπ ce⁻

0.079	K/L~0.3	L/M~2.5
0.088		
0.180		

C.T.Hibdon, C.O.Muehlhause, Phys. Rev. 88, 943 (1952); 87, 222A(1952).

$_{65}Tb^{161}_{96}$

τ	6.8^d	Gd(pile n); sπ ce⁻
γ	0.049	L/M = 3.7

No other γ

J.M.Cork, J.M.LeBlanc, W.H.Nester, F.B.Stumpf, Phys. Rev. 88, 685(1952).

$_{66}Dy^{165}_{99}$ 1.3m

γ 0.102 Dy(pile n); scin

J.M.Kahn, ORNL-1089(1951).

Capture γ's Dy(n,γ) sπ ce⁻

0.082
0.106
0.189

C.T.Hibdon, C.O.Muehlhause, Phys. Rev. 88, 943 (1952); 87, 222A(1952).

Ho Neutron resonances (ev) E_n = 0.1 to 30 ev

3.96	cryst s
12.8	

H.L.Foote, Jr., V.L.Sailor, H.H.Landon, BAPS 28, 1, M7(1953).

Er Neutron resonances (ev) E_n = 0.1 to 30 ev

0.51	9.55	21.2	cryst s
6.10	16.0	27.5	

H.L.Foote, Jr., V.L.Sailor, H.H.Landon, BAPS 28, 1, M7(1953).

$Er^{167}_{68\ 99}$ | $|Q|$ | 10.2 | para

G.S.Bogle, H.J.Duffus, H.E.D.Scovil, Proc. Phys. Soc. 65A, 760(1952).

Tm | Neutron resonances (ev) | E_n = 0.1 to 30 ev
3.96 | cryst s
15.0
18.0

H.L.Foote, Jr., V.L.Sailor, H.H.Landon, BAPS 28, 1, M7(1953).

$Tm^{170}_{69\ 101}$ | β^- | 24% | 0.884 | Tm(pile n); sl $\beta\gamma$
76% | 0.968 | sl
γ | 0.0841 | $\tau = 1.57 \times 10^{-9}$ s
$\alpha_K = 1.6$ $\alpha_L = 4.1$ $\alpha_M = 1.2$ | E2
$\epsilon_K < 0.3\%$ (β)(0.084γ)
No other γ's (< 0.02%)
F-K plots of both β's linear

R.L.Graham, J.L.Wolfson, R.E.Bell, Can. J. Phys. 30, 459(1952).

$Yb^{?}_{70\ ?}$ 6^s | γ | 0.21 | Yb(pile n); scin
0.10 (Dy impurity?)

J.H.Kahn, ORNL-1089(1951).

Lu | Neutron resonances (ev) | E_n = 0.1 to 30 ev
1.57 5.3 14.4 | cryst s
2.62 11.4 24.0
4.80

H.L.Foote, Jr., V.L.Sailor, H.H.Landon, BAPS 28, 1, M7(1953).

$Lu^{176}_{71\ 105}$ | Neutron resonance (ev) | cryst s
0.142

H.L.Foote, Jr., V.L.Sailor, H.H.Landon, BAPS 28, 1, M7(1953); verbal report.

$Hf^{179}_{72\ 107}$ 19^s | γ | 0.22 | Hf(pile n); scin

J.H.Kahn, ORNL-1089(1951).

$Ta^{181}_{73\ 108}$ | μ | 1.9 | S
Q | +5.9

B.W.Brown, D.H.Tamboulian, Phys. Rev. 88, 1158 (1952).

$Ta^{182}_{73\ 109}$ | γ | 0.9† | 0.065714 | 1.9† | 0.17936
10.0† | 0.067736 | 0.9† | 0.19830
0.8† | 0.084667 | 4.5† | 0.22205
4.6† | 0.10009 | 2.4† | 0.22927
0.9† | 0.11366 | 2.7† | 0.26409
0.2† | 0.11640 | 35.2† | 1.121
4.3† | 0.15241 | 15.7† | 1.188
1.4† | 0.15637 | 33.4† | 1.223
No Hf x ray | Ta(pile n), cryst
Possible decay schemes enumerated

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

$W^{186}_{74\ 112}$ | $\tau_{\beta\beta}$ | $>6 \times 10^{15}$ y | ppl
Assuming decay energy $\geq$ 2 Mev

J.M.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

$W^{187}_{74\ 113}$ | γ | 0.07200 | cryst
0.13425
0.4795
0.6189
0.6861
0.6189γ not crossover

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

γ | 0.072 | $\alpha_K \sim 2^*$ $\alpha < 2.5^*$ | E1 pc
0.134 | $\alpha_K \sim 2^*$ | M1
0.480
0.552
0.686 | E1
0.78
(0.48γ)(0.13γ) (0.55γ)(0.13γ) (0.78γ)(0.13γ)
No (0.618γ)(γ)
No 0.206γ (< 3% of 0.134γ)
0.48γ precedes 0.072γ

A.W.Sunyar, BAPS 28, 1, 23(1953); * verbal report.

Re | Neutron resonance (ev) | cryst s
2.16

H.H.Landon, V.L.Sailor, H.L.Foote, Jr., BAPS 28, 1, M8(1953).

$Os^{185}_{76\ 109}$ | γ | 0.654 | Os (pile n); sl ce$^-$
0.88

J.B.Swan, R.D.Hill, Phys. Rev. 88, 831(1952).

$Os^{191}_{76\ 115}$ 14^h | τ_1 | 14^h | Os ($\leq$ 22-Mev γ) Os(pile n)
No β^- (< 5%) | sπ
γ I.T. | 0.0742 | sπ ce$^-$ (Os)
$L_I : L_{II} : L_{III} : M_I : M_{III} : N$
42 : 24 : 100 : 14 : 35 : 15

J.B.Swan, R.D.Hill, Phys. Rev. 88, 831(1952).

γ | (0.074) | E3(73%) M4(27%)
From α_L's, e^-_L(0.074 I.T. γ)/e^-_L(0.13 g.s. γ), and (Os K x ray)/(Ir K x ray) when produced by Os(n,γ)

R.D.Hill, J.W.Mihelich, Phys. Rev. 89, 323(1953).

15.0^d | τ_2 | 15^d | Os ($\leq$ 22-Mev γ) Os(pile n)
β^- | ~0.14 | sπ
γ_1 50%* | 0.0417 | E2
γ_2 100%* | 0.1291 | M1,E2
K : L_I : L_{II} : L_{III} : M_I : M_{II} : M_{III} : N
γ_1 32 : 40 : —— : 11 : 19 : 9.5
γ_2 100 : 30 : 11 : 6.0 : ←— 12 —→ : 3.5
[e^-_L(0.129γ)] [e^-_L(0.042γ)]
*Assuming M1/E2 = 3 for 0.129γ

J.B.Swan, R.D.Hill, Phys. Rev. 88, 831(1952).

Os^{192} 76 116

$\tau_{\beta\beta}$ $>10^{14}$ y ppl

Assuming decay energy ≥2 Mev

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

Os^{193} 76 117 30h

τ 32h Os(pile n),

β^- ~1 not Os(≤22-Mev γ); a

Weak γ's with $14^h < \tau < 15^d$

~0.065 0.215 0.323 0.460

J.S.Swan, R.D.Hill, Phys. Rev. 88, 831(1952).

Ir Neutron resonance (ev) cryst s

0.654

H.H.Landon, V.L.Sailor, H.L.Foote, Jr., BAPS 28, 1, M8(1953).

Ir^{192} 77 115 1.4m

γ (0.057) α_L>400 Ir(pile n); pc

Ir L x ray but no unconverted γ found

J.H.Kahn, ORNL-1089(1951).

70d

γ	0.4†	0.13633	30.0†	0.46798	
	1.0†	0.20131	1.1†	0.4848	
	7.5†	0.20574	1.1†	0.5884	
	38.0†	0.29594	1.4†	0.6045	
	37.0†	0.30845	0.5†	0.6129	
	99.0†	0.31646			

Os K x ray Pt K x ray Ir(pile n), cryst

Level scheme given

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

γ	2^+	0.200	10^+	0.467	sl pe^-
	3^+	0.205	5^+	0.486	
	60^+	0.295	10^+	0.589	
	50^+	0.307	30^+	0.606	
	100^+	0.315			

J.L.Wolfson, Proc. Roy Soc. Canada 44, 193A (1950).

Pt^{198} 78 120

$\tau_{\beta\beta}$ $>10^{15}$ y ppl

Assuming decay energy ≥2 Mev

J.H.Fremlin, M.C.Walters, Proc. Phys. Soc. 65A, 911(1952).

Au Neutron resonance (ev) cryst s

4.93

H.H.Landon, V.L.Sailor, H.L.Foote, Jr., BAPS 28, 1, M8(1953).

Neutron resonance

4.85 ev

A.W.Merrison, E.R.Wiblin, Proc. Roy. Soc. 215A, 278(1952).

Au^{195} 79 116 30s

τ 30s d 38hHg chem

γ 0.056 sl ce^-

0.259

O.Huber, R.Joly, P.Scherrer, N.F.Verster, Helv. Phys. Acta 25, 621(1952).

Au^{198} 79 119

β^- 0.958 sl

1.370 $\Delta I = 3$, yes

J.L.Wolfson, L.G.Elliott, Proc. Roy. Soc. Canada 46, 142A(1952).

γ 0.411770 ± 0.000036 cryst

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond Phys. Rev. 88, 775(1952).

γ 0.41173 ± 0.00007 $s\pi\sqrt{2}$ ce^-

Compared with 0.51084 Th L line in Tl^{208}

A.Hedgran, D.Lind, Arkiv Fysik 5, 177(1952).

Au^{200} 79 121

τ	48m	Hg^{201}(≤28-Mev γ)	chem
β^-	2.2		a
γ	0.39		scin
	1.13		

$\beta/\gamma = 6$

F.D.S.Butement, R.Shillito, Proc. Phys. Soc. 65A, 945(1952).

Au^{201} 79 122

τ	26m	Hg^{202}(≤28-Mev γ)	chem
β^-	1.5		a
γ	0.55		scin

$\beta/\gamma = 20$

F.D.S.Butement, R.Shillito, Proc. Phys. Soc. 65A, 945(1952).

Au^{202} ? 79 123

τ ~25s Hg(18-Mev n) chem

F.D.S.Butement, R.Shillito, Proc. Phys. Soc. 65A, 945(1952).

Au^{203} 79 124

τ	55s	Hg^{204}(≤28-Mev γ)	chem
β^-	1.9		a
γ	0.69		scin

$\beta/\gamma = 10$

F.D.S.Butement, R.Shillito, Proc. Phys. Soc. 65A, 945(1952).

Hg Neutron resonances (ev) E_n = 3 ev to 10 kev

E_o	$\sigma_o \Gamma^2$
23.3	9
35.4	170
191	
~350	

E.R.Hodgson, J.F.Gallagher, E.M.Bowey, Proc. Phys. Soc. 65A, 992(1952).

Hg^{195} 80 115 38h

γ		0.036	Au(25-Mev d)	chem
γ	I.T.	0.122		sl ce^-

O.Huber, R.Joly, P.Scherrer, N.F.Verster, Helv. Phys. Acta 25, 621(1952).

9.5h

τ_2	9.5h	Au(25-Mev d)	chem
γ	0.061		sl ce^-
ce^-	0.099		

O.Huber, R.Joly, N.F.Verster, Helv. Phys. Acta 25, 621(1952).

$_{80}Hg^{200}_{120}$ Capture γ $Hg^{199}(n,\gamma)$ $s\pi$ ce^-
~0.28

C.T.Hibdon, C.O.Muehlhause, Phys. Rev. 88, 943 (1952); 87, 222A(1952).

$_{81}Tl^{204}_{123}$ β^- 98.5% **0.760** $\Delta I = 2$, yes shape 4π scin
ϵ ~1.5%

$E_{dis}(\epsilon)$ ~0.4 (calc)
No 0.37γ (< 10^{-2}%)

E.der Mateosian, A.Smith, Phys. Rev. 88, 1186 (1952).

$_{81}Tl^{208}_{127}$ γ (2.62) $\alpha_{pair} = 4.3 \times 10^{-4}$ E2 s

H.Slätis, K.Siegbahn, Arkiv Fysik 4, 485(1952).

γ 0.05† **0.27735** Th^{228} source, cryst
0.15† **0.5108**
0.40† **0.5830**
0.24098γ (0.10†) unassigned
†Relative to 0.238γ of Pb^{212}

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

$_{81}Tl^{209}_{128}$ β^- **1.99** d 10^dAc; s

F.Wagner, Jr., W.S.Freedman, D.W.Engelkemeir, L.B.Magnusson, Phys. Rev. 88, 171A(1952).

Pb Variations in relative isotopic abundances

C.B.Collins, R.W.Farquhar, R.D.Russell, Phys. Rev. 88, 1275(1952).

$_{82}Pb^{201}?_{119}$ $_{50^s}$ τ_1 50^s Tl(p) chem, not Hg(p)
γ ~1† **0.25** scin
~1† **0.42**
~4† **0.67**

N.J.Hopkins, Phys. Rev. 88, 680(1952).

$_{82}Pb^{202}?_{120}$ $_{5.6^s}$ τ_1 5.6^s Tl(p), not Hg(p)
γ **0.89** scin

N.J.Hopkins, Phys. Rev. 88, 680(1952).

$_{82}Pb^{207}_{125}$ $_{0.8^s}$ τ_1 0.80^s

N.J.Hopkins, Phys. Rev. 88, 680(1952).

$_{82}Pb^{209}_{127}$ β^- **0.63** d 10^dAc chem; s, scin

F.Wagner, Jr., W.S.Freedman, D.W.Engelkemeir, L.B.Magnusson, Phys. Rev. 88, 171A(1952).

$_{82}Pb^{210}_{128}$ γ **0.04652** cryst
No other γ's from 0.016 to 0.062 (< 2%)

G.T.Ewan, W.A.S.Ross, Nature 170, 760(1952).

$_{82}Pb^{210}_{128}$ γ ~10^+ **0.0464** $\alpha = 8.5$ pc $s\pi$
$L_I : L_{II} : L_{III} : M : NO$
100 : 7.5 : 0.7 : 26 : 7.7
No other γ (< 0.5%)
†Photons per 100 disintegrations

C.S.Wu, F.Boehm, E.Nagel, BAPS 28, 1, 24(1953); verbal report.

$_{82}Pb^{212}_{130}$ τ 10.67^h

H.Buttar, Naturwiss. 39, 575(1952).

γ **0.23860** cryst

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

$_{82}Pb^{214}_{132}$ γ **0.053226** Rn^{222} source, cryst
20^+ **0.24192**
55^+ **0.29522**
100^+ **0.35199**

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

$_{83}Bi^{209}_{126}$ τ 2×10^{17}y ppl
α **2.9**
7 α tracks, $E_\alpha = 2.9$, in Bi impregnated plate kept 100 days in N_2, 18°C

W.Riezler, W.Porschen, Z. Naturforsch. 7a, 634 (1952).

Very few low energy α's in Bi loaded plate τ of 2×10^{17}y, E_α of 3 Mev not confirmed

E.P.Hincks, C.M.Millar, Proc. Roy. Soc. Canada 46, 143A(1952).

$_{83}Bi^{210}_{127}$ $_{4.9^d}$ No ce$^-$, no nuclear γ pc $s\pi$

C.S.Wu, F.Boehm, E.Nagel, BAPS 28, 1, 24(1953).

$_{83}Bi^{212}_{129}$ γ 0.15† **0.729** Th^{228} source, cryst
†Relative to 0.238γ of Pb^{212}

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

(6.04α) (0.04γ) (θ) b=1.30 I= 1,3,4 or 1,4,5

J.Horton, R.Sherr, BAPS 28, 1, 25(1953).

$_{83}Bi^{213}_{130}$ β^- **0.96** d 10^dAc chem; s
1.39
γ **0.120**
0.435
(1.39β) (0.12γ)

F.Wagner, Jr., W.S.Freedman, D.W.Engelkemeir, L.B.Magnusson, Phys. Rev. 88, 171A(1952).

$_{83}Bi^{214}_{131}$ γ 1.6† **0.6094** Rn^{222} source, cryst
†Relative to 0.352γ of Pb^{214}

D.E.Muller, H.C.Hoyt, D.J.Klein, J.W.M.DuMond, Phys. Rev. 88, 775(1952).

$\gamma\gamma(\theta)$ b ~0.3

F.Demichelis, R.Malvano, Nuovo Cimento 9, 1106 (1952).

$_{88}Ra^{226}_{138}$ α 5.7% (4.611) s, ppl
No α's from 3.6 to 4.4 (< 0.02%)* ic

F.Asaro, I.Perlman, Phys. Rev. 88, 129(1952).
*A.Ghiorso, ibid.

Ra^{226} 88 138

γ (0.186) $\alpha = 0.9^{*}$ E2 αe^{-}

*Assuming 4.611α in 6.4% of disintegrations

C.Victor, J.Teillac, P.Falk-Vairant, G.Boussieres, J. phys. radium 13, 565(1952).

Ra^{227} 88 139

τ 41.2^{m} $Ra^{226}(n,\gamma)$

β^{-} 1.30

γ 0.29

0.50

J.P.Butler, J.S.Adam, quoted by B.W.Sargent, Nature 170, 832(1952).

Th Neutron resonances (ev) E_n = 2 ev to 2 kev

25 $\sigma_o \Gamma^2 = 64$

80

170

E.R.Hodgson, J.F.Gallagher, E.M.Bowey, Proc. Phys. Soc. 65A, 992(1952).

Th^{228} 90 138

γ (0.084) $\alpha = 12^{*}$ E2 αe^{-}

*Based on $\gamma/\alpha = 0.02^{**}$

C.Victor, J.Teillac, P.Falk-Vairant, G.Boussieres, J. phys. radium 13, 565(1952); **M.Riou, Ibid.

Th^{230} 90 140

γ $100^{\dagger}$ 0.068 scin

$14^{\dagger}$ 0.142

$5^{\dagger}$ 0.255

0.615γ due to Bi^{214} impurity*

†Photons per 10^4 disintegrations

F.Rasetti, E.C.Booth, BAPS 28, 1, Z6(1953); *priv. comm.

Th^{232} 90 142

γ 0.075 ppl

$e^{-}/\alpha = 0.2$

G.Albouy, J. phys. radium 13, 309(1952).

Pa^{231} 91 140

γ 0.044 cc

0.066

J.Teillac, Ann. Phys. 7, 396(1952).

γ 0.0336 sm ce^{-}

0.0380

0.0569

0.0635

0.0822

	Rel. intensity of ce^{-}
0.102	$L_{II} : L_{III} : M = 2 : 2 : 2$
0.198	K : L = 1 : 5
0.259	K : L = 2 : 1
0.301	K : L : M = 100 : 20 : 7
0.331	K : L : M = 60 : 10 : 1
0.357	K : L = 10
0.383	K = 5

P.Falk-Vairant, Compt. rend. 235, 796(1952).

Pa^{234} 91 143 1.14^{m}

τ 1.175^{m}

F.Barendregt, Sj.Tom, Physica 17, 817(1951).

U^{233} 92 141

γ $5^{\dagger}$ 0.0428 pc

$1^{\dagger}$ 0.0561

(L x ray)/α = 0.04

†Photons per 10^4 α's

D.West, J.K.Dawson, C.J.Mandleberg, Phil. Mag. 43, 875(1952).

γ_1 ~0.040 ppl

γ_2 (0.056)

γ_3 (0.099)

$\alpha + e_1^{-}$, $\alpha + e_1^{-} + e_2^{-}$, $\alpha + e_3^{-}$ tracks

$(\alpha + e_1^{-})/(\alpha + e_1^{-} + e_2^{-}) \sim 70$ $(\alpha + e^{-})/\alpha = 0.09$

K.W.Bisgård, Proc. Phys. Soc. 65A, 677(1952).

U^{234} 92 142

τ 2.475×10^{5} y chem, ms; 1c

± 0.016 96.99% U^{234}

E.H.Fleming, Jr., A.Ghiorso, B.B.Cunningham, Phys. Rev. 88, 642(1952).

U^{235} 92 143

τ 7.13×10^{8} y chem, ms; 1c

± 0.16 99.94% U^{235}

E.H.Fleming, Jr., A.Ghiorso, B.B.Cunningham, Phys. Rev. 88, 642(1952).

U^{236} 92 144

τ 2.391×10^{7} y chem, ms; 1c

± 0.018 96.65% U^{236}

E.H.Fleming, Jr., A.Ghiorso, B.B.Cunningham, Phys. Rev. 88, 642(1952).

U^{239} 92 147

γ 0.074 α_L=0.20 U(pile n); pc

J.H.Kahn, ORNL-1089(1951).

Pu^{238} 94 144

γ $6^{\dagger}$ 0.013 a

$11^{\dagger}$ 0.018

$0.4^{\dagger}$ 0.042

~0.17

†Photons per 10^2 α's

G.W.Reed, Jr., AECD-3185(1947); NSA 5-5421(1951).

γ 0.0450 pc

D.West, J.K.Dawson, C.J.Mandleberg, Phil. Mag. 43, 875(1952).

α 11% 5.100 a

20% 5.137

69% 5.150

No other α's from 4.82 to 5.57 Mev (<0.3%)

F.Asaro, I.Perlman, Phys. Rev. 88, 828(1952).

Pu^{239} 94 145

γ $2^{\dagger}$ 0.0385 pc

$7^{\dagger}$ 0.0520

(K x ray)/α = ~2×10^{-3} (L x ray)/α = 0.04

†Photons per 10^5 α's

D.West, J.K.Dawson, C.J.Mandleberg, Phil. Mag. 43, 875(1952).

γ	40^{+}	0.039		pc
	140^{+}	0.053		sl ce^{-}, pc
	110^{+}	0.100		scin
	50^{+}	0.124		scin
	30^{+}	0.384		scin

W.S.Freedman, F.Wagner, Jr., D.W.Engelkemeir, Phys. Rev. 88, 1155(1952).

U L x ray/$\alpha = 3 \times 10^{-2}$ pc

M.Israel, Phys. Rev. 88, 682(1952).

$_{94}Pu^{240}_{146}$

α	24%	5.118	Pu(pile n) ms; s
	76%	5.162	

F.Asaro, I.Perlman, Phys. Rev. 88, 828(1952).

γ 0.050 Pu^{239}(pile n); sl ce^{-}

W.S.Freedman, F.Wagner, Jr., D.W.Engelkemeir, Phys. Rev. 88, 1155(1952).

$_{94}Pu^{241}_{147}$

β^{-}		0.0205	Pu^{240}(pile n); sl
γ	100^{+}	0.100 (K x ray?)	scin
	20^{+}	0.145	

$^{+}$Photons per 10^{7} β's

W.S.Freedman, F.Wagner, Jr., D.W.Engelkemeir, Phys. Rev. 88, 1155(1952).

$_{95}Am^{241}_{146}$

γ	25^{+}	0.0264	Pu^{240}(pile n,$\gamma\beta^{-}$); pc
		0.041	sl ce^{-}
	100^{+}	0.059	sl ce^{-}, pc

W.S.Freedman, F.Wagner, Jr., D.W.Engelkemeir, Phys. Rev. 88, 1155(1952).

γ 0.0603 d 10^{y}Pu; pc

D.West, J.K.Dawson, C.J.Mandleberg, Phil. Mag. 43, 875(1952).

NEUTRON CROSS SECTIONS

Reaction	σ Type	Value	Energy	Ref.
H(n)	σ_t as f(T) for H_2		~0.034 ev	52g2
	σ_t	3.38	1.32	53s1
	σ_t	0.686	14.1	52c1
	σ_t	0.074 - 0.043	97 - 220	52m1
	σ_t	0.037	390	53h1
He(n)	σ_t	1.02	14.1	52c1
	σ_t	0.200	84	53h2
$Li^6(n,t)He^4$		25 mb	14	53f1
$Li^6(n,d)He^5$		~140 mb*	14.2	52r1
$Li^6(n,d)He^5$ g.s.		80 mb	14	53f1
$Li^6(n,d')He^5$ excited		81 mb	14	53f1
$Li^6(n,p)He^6$		6 mb	14	53f1
$Li^6(n,p)$	σ(0.83 Te)	6.7 mb	14	52b1

*Erroneously reported as ~14 mb, NSA 6, #20(1952).

Neutron Cross Sections - continued

Reaction	σ Type	Value	Energy	Ref.
$Li^6(n)$	σ_t	1.39	14.1	52c1
$Li^7(n,t)He^5$		53 mb	14	53f1
$Li^7(n,d)$	σ(0.83^{s}He)	9.8 mb	14	52b1
$Li^7(n)$	σ_t	1.45	14.1	52c1
$Be^9(n,\alpha)$	σ(0.83^{s}He)	10 mb	14	52b1
$Be^9(n)$	σ_t	1.53	14.1	52c1
B(n,<11.5n) 82% B^{10}	σ_{in}	0.69	14	52p2
(n, <2.6n)		0.24		
$B^{10}(n)$	σ_t	1.47	14.1	52c1
$B^{11}(n)$	σ_t	1.40	14.1	52c1
C(n,<11.5n)	σ_{in}	0.76	14	52p2
(n, <2.6n)		0.28		
$C^{12}(n,2n)$	σ(20^{m}C)	graph	24 - 27	52b1
C(n)	σ_t	2.21	1.32	53s1
	σ_t	1.32	14.1	52c1
	σ_t	0.502 - 0.297	97 - 220	52m1
	σ_t	0.287	390	53h1
N(n,<11.5n)	σ_{in}	0.79	14	52p2
(n, <2.6n)		0.46		
N(n)	σ_t	1.59	14.1	52c1
O(n)	σ_t	1.58	14.1	52c1
F(n)	σ_t	1.70	14.1	52c1
Na(n)	σ_t	1.71	14.1	52c1
	σ_t	graph	0.12 - 1	52s1
Mg(n)	σ_t	1.75	14.1	52c1
Al(n,<11.5n)	σ_{in}	1.06	14	52p2
(n, <2.6n)		0.62		
Al(n)	σ_t	1.38	5ev - 5kev	52m4
	σ_t	1.73	14.1	52c1
$Al^{27}(n,\alpha)$	σ(15.0^{h}Na)	0.135	14.1	52f1
$Al^{27}(n,p)$	σ(9.6^{m}Mg)	0.079	14.1	52f1
Si(n)	σ_t	1.86	14.1	52c1
P(n)	σ_t	1.97	14.1	52c1
$P^{31}(n,p)$	σ(2.6^{h}S1)	0.091	14.1	52f1
S(n)	σ_t	2.06	13.3	52a1
	σ_t	1.92	14.1	52c1
$S^{33}(n,p)$	σ(25^{d}P)	2.3 mb	th	52W1
Cl(n)	σ_t	2.00	14.1	52c1

Neutron Cross Sections - continued

Reaction	σ Type	Value	Energy	Ref.
K(n)	σ_t	2.24	14.1	52c1
K^{39}(n)	σ_a	1.9	th	52p1
K^{40}(n)	σ_a	~ 65	th	52p1
K^{41}(n)	σ_a	1.2	th	52p1
Ca(n)	σ_t	2.19	14.1	52c1
Ti(n)	σ_t	2.28	14.1	52c1
Cr(n)	σ_t	2.45	14.1	52c1
Mn(n,γ)	σ(2.6^{h}Mn)	12.0	th	52b2
Mn(n)	σ_t	2.54	14.1	52c1
Fe(n,<11.5n)	σ_{in}	1.45	14	52p2
(n, <2.6n)		1.21		
(n, <1.4n)		0.78		
Fe(n)	σ_t	2.60	14.1	52c1
	σ_t	graph	1 - 3.2	52m2
Fe^{56}(n,p)	σ(2.6^{h}Mn)	0.124	14.1	52f1
Co(n)	σ_t	graph	1ev - 5kev	52m4
	σ_t	2.72	14.1	52c1
Co^{59}(n,γ)	σ(10^{m}Co)	19	th	52m3
Ni(n)	σ_t	graph	5ev - 5kev	52m4
Ni(n)	σ_t	2.67	14.1	52c1
	σ_t	graph	1 - 3.2	52m2
Ni^{58}(n)	σ_a	4.2	th	52p1
Ni^{60}(n)	σ_a	2.5	th	52p1
Ni^{61}(n)	σ_a	2	th	52p1
Ni^{62}(n)	σ_a	15	th	52p1
Cu(n,<11.5n)	σ_{in}	1.51	14	52p2
(n, <2.6n)		1.32		
(n, <1.4n)		0.87		
Cu(n)	σ_t	graph	1 - 3.2	52m2
	σ_t	3.1	13.3	52a1
	σ_t	2.5	14	52g1
	σ_t	2.96	14.1	52c1
Cu^{63}(n,2n)	σ(10^{m}Cu)	0.510	14.1	52f1
Cu^{63}(n,2n)	σ(10^{m}Cu)	graph	12 - 27	52b2
Cu^{65}(n,2n)	σ(12.8^{h}Cu)	0.970	14.1	52f1
Cu^{65}(n,p)	σ(2.56^{h}Ni)	0.019	14.1	52f1
Zn(n)	σ_t	3.06	14.1	52c1
	σ_t	graph	1 - 3.2	52m2
Ga(n)	σ_t	graph	5ev - 5kev	52m4
	σ_t	3.19	14.1	52c1
Ga^{69}(n)	σ_a	2.0	th	52p1
Ga^{71}(n)	σ_a	4.9	th	52p1

Neutron Cross Sections - continued

Reaction	σ Type	Value	Energy	Ref.
Se(n)	σ_t	3.56	14.1	52c1
Se^{74}(n)	σ_a	50	th	52p1
Se^{76}(n)	σ_a	82	th	52p1
Se^{77}(n)	σ_a	40	th	52p1
Se^{78}(n)	σ_a	0.4	th	52p1
Se^{80}(n)	σ_a	0.59	th	52p1
Se^{82}(n)	σ_a	2	th	52p1
Br(n)	σ_t	3.52	14.1	52c1
Kr^{78}(n)	σ(34^{h}Kr)	1.6	th	52b5
Sr(n)	σ_t	graph	0.05 - 3.2	52m2
	σ_t	3.68	14.1	52c1
Sr^{84}(n,γ)	σ(65^{d}Sr)	0.32	th	52h2
Y(n)	σ_t	graph	0.05 - 3.2	52m2
	σ_t	3.88	14.1	52c1
Zr(n)	σ_t	graph	1 - 3.2	52m2
	σ_t	3.6	14	52g1
	σ_t	4.00	14.1	52c1
Nb(n)	σ_t	graph	0.12 - 3.2	52m2
	σ_t	4.02	14.1	52c1
Mo(n)	σ_t	graph	1ev - 10kev	52h5
	σ_t	graph	0.02 - 3.2	52m2
	σ_t	4.04	14.1	52c1
Mo^{92}(n)	σ_a	≤ 0.3	th	52p1
Mo^{92}(n,2n)	σ(15.5^{m}Mo)	graph	13.2 - 27	52b2
Ag(n)	σ_t	graph	12ev - 5kev	52m4
	σ_t	graph	1 - 3.2	52m2
	σ_t	4.34	14.1	52c1
Ag^{107}(n,2n)	σ(24.5^{m}Ag)	0.56	14.1	52f1
Ag^{109}(n,2n)	σ(2.3^{m}Ag)	1.0	14.1	52f1
Cd(n,<11.5n)	σ_{in}	1.89	14	52p2
(n, <2.6n)		1.66		
(n, <1.4n)		1.14		
Cd(n)	σ_t	7900	0.18 ev	52b3
	σ_t	4.44	14.1	52c1
In(n)	σ_t	graph	1 - 3.2	52m2
	σ_t	4.53	14.1	52c1
Sn(n)	σ_t	graph	1 - 3.2	52m2
	σ_t	4.68	14.1	52c1
Sb(n)	σ_t	graph	1 - 3.2	52m2
	σ_t	4.71	14.1	52c1
Sb^{121}(n)	σ_a	5.7	th	52p1

Neutron Cross Sections - continued

Reaction	σ Type	Value	Energy	Ref.
Te (n)	σ_t	4.9	14.1	52c1
I (n)	σ_t	graph	5ev - 5kev	52m4
	σ_t	graph	1 - 3.2	52m2
	σ_t	4.7	14.1	52c1
Ba (n)	σ_t	graph	0.05 - 3.2	52m2
	σ_t	5.2	14.1	52c1
La (n)	σ_t	graph	0.02 - 3.2	52m2
	σ_t	5.2	14.1	52c1
Ce (n)	σ_t	graph	0.02 - 3.2	52m2
	σ_t	5.1	14.1	52c1
Pr (n)	σ_t	graph	0.05 - 3.2	52m2
	σ_t	4.9	14.1	52c1
Nd^{142} (n)	σ_a	18	th	52p1
Nd^{143} (n)	σ_a	290	th	52p1
Nd^{144} (n)	σ_a	4.8	th	52p1
Nd^{145} (n)	σ_a	52	th	52p1
Nd^{146} (n)	σ_a	9.8	th	52p1
Nd^{148} (n)	σ_a	~3.3	th	52p1
Nd^{150} (n)	σ_a	~3	th	52p1
Hf^{174} (n)	σ_a	~500	th	52p1
Hf^{176} (n)	σ_a	~15	th	52p1
Hf^{177} (n)	σ_a	380	th	52p1
Hf^{178} (n)	σ_a	70	th	52p1
Hf^{179} (n)	σ_a	~50	th	52p1
Hf^{180} (n)	σ_a	~13	th	52p1
Ta (n)	σ_t	graph	1 - 3.2	52m2
	σ_t	5.2	14.1	52c1
W (n)	σ_t	graph	1 - 3.2	52m2
	σ_t	5.3	14.1	52c1
Pt (n)	σ_t	5.4	14.1	52c1
Au (n, <11.5n)	σ_{in}	2.51	14	52p2
(n, <2.6n)		2.06		
(n, <1.4)		1.47		
Au (n)	σ_t	5.3	14.1	52c1
Hg (n)	σ_t	graph	3ev - 10kev	52h5
	σ_t	5.4	14.1	52c1
Tl (n)	σ_t	5.4	14.1	52c1

Neutron Cross Sections - continued

Reaction	σ Type	Value	Energy	Ref.
Pb (n, <11.5n)	σ_{in}	2.56	14	52p2
(n, <2.6n)		2.29		
(n, <1.4n)		0.91		
Pb (n)	σ_t	graph	1 - 3.2	52m2
	σ_t	5.4	14.1	52c1
Pb^{204} (n)	σ_a	~0.9	th	52p1
Pb^{206} (n)	σ_a	~0.1	th	52p1
	σ_t	graph	1 - 3.2	52m2
Pb^{207} (n)	σ_a	0.70	th	52p1
Pb^{208} (n)	σ_a	≤0.3	th	52p1
Bi (n, <11.5n)	σ_{in}	2.56	14	52p2
(n, <2.6n)		2.28		
(n, <1.4n)		1.03		
Bi (n)	σ_t	graph	1 - 3.2	52m2
	σ_t	5.5	14.1	52c1
Ra^{226} (n,γ)	$\sigma(42^m Ra^{227})$	22	th ?	52b4
Th (n)	σ_t	graph	2ev - 2kev	52h5
	σ_t	6.11	13.9	50l1
U (n)	σ_s coh	9.0	th	51s1
	σ_t	9.0	th	51s1
	σ_t	5.9	14.1	52c1
	σ_t	5.7	14.1	52c1

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GROUND STATE Q'S

Reaction	Standard	Value	Method	Ref.
$Be^9(p,\alpha)Li^6$	$Li^7(p,n)$	+ 2.126* ± 0.004	EA	52c3
$B^{10}(p,\alpha)Be^7$	$Li^7(p,n)$	+ 1.147 ± 0.0025	EA	52c3
$B^{10}(p,He^3)Be^8$	$Li^7(p,n)$	− 0.536 ± 0.003	EA	52c3
$N^{14}(d,p)N^{15}$	Po^{212} α	+ 8.613 ± 0.011	s	52m5
$O^{16}(d,\alpha)N^{14}$	Li(p,n)	+ 3.113 ± 0.0035	EA	52c3
$O^{18}(p,\alpha)N^{15}$	$Be^9(d,\alpha)$	+ 3.96 ± 0.04	s	51s2
$F^{19}(\alpha,p)Ne^{22}$		+ 1.57	ppl	52h6
$Ne^{21}(p,n)Na^{21}$	$F^{19}(p,n)$	− 3.765		52k1
$Ne^{21}(d,\alpha)F^{19}$	Bi^{212} α	+ 6.432 ± 0.010	s	52m5
$Ne^{21}(d,p)Ne^{22}$	Po^{212} α	+ 8.137 ± 0.011	s	52m5
$Ne^{22}(p,n)Na^{22}$	$F^{19}(p,n)$	− 3.913		52k1
$Na^{23}(d,p)Na^{24}$	Bi^{212} α	+ 4.723 ± 0.008	s	52m5
$Na^{23}(d,p)Na^{24}$	Po α	+ 4.731 ± 0.007	ppl	52s2
$Na^{23}(\alpha,p)Mg^{26}$		+ 1.55	ppl	52h6
$Mg^{24}(\alpha,p)Al^{27}$		− 1.613 ± 0.010	s	52k2
$Al^{27}(\alpha,p)Si^{30}$		+ 2.26 ± 0.05	ppl	51r1
$Cl^{35}(d,p)Cl^{36}$		+ 6.3		52K3
$Ti^{46}(d,p)Ti^{47}$	$O^{16}(d,p)$	+ 6.45 ± 0.05	range	52p4
$Ti^{47}(d,p)Ti^{48}$	$O^{16}(d,p)$	+ 8.14 ± 0.05 ?	range	52p4
$Ti^{48}(d,p)Ti^{49}$	$O^{16}(d,p)$	+ 5.81 ± 0.04	range	52p4
$Ti^{49}(d,p)Ti^{50}$	$O^{16}(d,p)$	+ 8.62 ± 0.05	range	52p4
$Ti^{50}(d,p)Ti^{51}$	$O^{16}(d,p)$	+ 4.11 ± 0.07	range	52p4
$V^{51}(d,p)V^{52}$		+ 6.25	a, pc	51h1

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PACKING FRACTION DIFFERENCES

Δf, in Units 10^{-4} amu

Doublet	Δf	Ref.
$Ni^{61} - Te^{122}$	−3.43 ± 0.05	52h4
$Ni^{62} - Te^{124}$	−3.71 ± 0.03	52h4
$Ni^{64} - Te^{128}$	−3.81 ± 0.05	52h4
$Cu^{65} - Te^{130}$	−3.95 ± 0.03	52h4
$A^{40} - C_2O$	−8.186 ± 0.005	52j1
$K^{40} - C_2O$	−7.78 ± 0.02	52j1
$Ca^{40} - C_2O$	−8.139 ± 0.002	52j1
$Pd^{102} - C_4H_3$	−13.933 ± 0.008	52h3
$Pd^{104} - C_4H_4$	−15.32 ± 0.01	52h3
$Pd^{105} - C_8H_9$	−15.78 ± 0.01	52h3
$Pd^{106} - C_4H_5$	−16.57 ± 0.02	52h3
$Pd^{106} - C_8H_{10}$	−16.52 ± 0.02	52h3
$Pd^{108} - C_4H_6$	−17.64 ± 0.01	52h3
$Pd^{110} - C_4H_7$	−18.65 ± 0.01	52h3
$Cd^{106} - C_4H_5$	−16.26 ± 0.01	52h3
$Cd^{108} - C_4H_6$	−17.58 ± 0.01	52h3
$Cd^{110} - C_4H_7$	−18.74 ± 0.01	52h3
$Cd^{111} - C_8H_{15}$	−19.203 ± 0.007	52h3
$Cd^{112} - C_4H_8$	−19.818 ± 0.009	52h3
$Cd^{112} - C_8H_{16}$	−19.860 ± 0.008	52h3
$Cd^{113} - C_8H_{17}$	−20.231 ± 0.008	52h3
$Cd^{114} - C_4H_9$	−20.82 ± 0.01	52h3
$Cd^{114} - C_3H_5O$	−14.44 ± 0.01	52h3
$Cd^{116} - C_3H_6O$	−15.41 ± 0.01	52h3

Packing Fraction Differences, Δf, in Units 10^{-4} amu (continued)

Doublet	Δf	Ref.
$In^{113} - C_8H_{17}$	-20.245 ± 0.009	52h3
$In^{115} - C_9H_7$	-13.148 ± 0.009	52h3
$Sn^{115} - C_9H_7$	-13.17 ± 0.02	52h3
$Sn^{116} - C_3H_6O$	-15.65 ± 0.02	52h3
$Sn^{116} - C_9H_8$	-13.83 ± 0.01	52h3
$Sn^{117} - C_9H_9$	-14.299 ± 0.008	52h3
$Sn^{118} - C_3H_7O$	-16.72 ± 0.02	52h3
$Sn^{118} - C_9H_{10}$	-14.94 ± 0.02	52h3
$Sn^{119} - C_9H_{11}$	-15.376 ± 0.009	52h3
$Sn^{120} - C_5$	- 8.15 ± 0.01	52h3
$Sn^{122} - C_5H$	- 9.20 ± 0.01	52h3
$Sn^{124} - C_5H_2$	-10.169 ± 0.008	52h3
$Te^{120} - C_9H_{12}$	-15.79 ± 0.01	52h3
$Te^{122} - C_5H$	- 9.244 ± 0.007	52h3
$Te^{122} - Ni^{61}$	+ 3.43 ± 0.05	52h4
$Te^{123} - C_5H$	+ 9.06 ± 0.03	52h3
$Te^{124} - C_5H_2$	-10.340 ± 0.008	52h3
$Te^{124} - Ni^{62}$	+ 3.71 ± 0.03	52h4
$Te^{125} - C_5H_2$	+10.16 ± 0.03	52h3
$Te^{126} - C_5H_3$	-11.359 ± 0.006	52h3
$Te^{128} - C_{10}H_8$	-12.273 ± 0.009	52h3
$Te^{128} - Ni^{64}$	+ 3.81 ± 0.05	52h4
$Te^{130} - Cu^{65}$	+ 3.95 ± 0.03	52h4
$Te^{130} - C_5H_5$	-13.180 ± 0.006	52h3
$I^{127} - C_{10}H_7$	-11.82 ± 0.01	52h3
$Xe^{124} - C_5H_2$	-10.098 ± 0.005	52h3
$Xe^{126} - C_5H_3$	-11.31 ± 0.01	52h3
$Xe^{128} - C_{10}H_8$	-12.432 ± 0.006	52h3
$Xe^{129} - C_3H_7$	-20.12 ± 0.01	52h3
$Xe^{130} - C_5H_5$	-13.451 ± 0.006	52h3
$Xe^{131} - CO_2$	- 4.94 ± 0.03	52h3
$Xe^{132} - C_5H_6$	-14.394 ± 0.009	52h3
$Xe^{132} - CO_2$	- 4.95 ± 0.01	52h3

Packing Fraction Differences, Δf, in Units 10^{-4} amu (continued)

Doublet	Δf	Ref.
$Xe^{134} - C_5H_7$	-15.257 ± 0.007	52h3
$Xe^{136} - C_5H_8$	-16.051 ± 0.006	52h3

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